

Grass roots organization for promoting sustainable agriculture and food security: the experience of Grameen Bank in Bangladesh

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Abstract

The Grameen Bank of Bangladesh has developed a target group-oriented financial institution to provide credit to land-poor households so that they could generate self-employment in economic activities of their choice. Initially, the Bank basically financed nonfarm rural enterprises. But with increases in income, the land-poor borrowers of the bank got access to land through the tenancy market and became involved in crop production activities and contributed to growth in foodgrain production. The Grameen Bank attempted to increase food production by establishing an independent Krishi (Agriculture) Foundation for developing an efficient irrigation management system to promote modern agriculture by providing inputs in kind and management advice, in exchange for a share of the harvest. More than 95% of Grameen Bank borrowers are women. Since the Bank has already mobilized these socially disadvantaged groups in village-level associations, it will be easier to extend natural resource management and mechanical technologies to conserve natural resources, add value to rice production, and reduce the drudgery of women.

Introduction

Bangladesh has been experimenting with a rural credit program for the low-income households, through the Grameen Bank. Grameen means rural, but Grameen Bank is different from rural branches of commercial banks or specialized financial institutions. It is a target group-oriented credit institution set up to provide loans to households that own less than 0.2 ha of land. Initiated in 1976 by a professor of economics from Chittagong University (M. Yunus), the bank started as an action research project in a village to test the hypothesis that if the poor are provided access to working capital, they can generate self-employment and organize economic activities that can ultimately alleviate poverty without external assistance. After a 3-yr experimental period in the Chittagong District, the project was replicated in five districts of Bangladesh during 1979-82, with financial assistance from the State Bank of Bangladesh and the International Fund for Agricultural Development. A government ordinance in September 1983 transformed the project into a specialized credit institution owned by its borrower-members. Since then, the Bank has expanded at a rapid rate in Bangladesh, and is now being replicated in other countries, as a model of poverty alleviation through microcredit.

The success behind the Grameen Bank was the setting up of a strong village-level organization for all-round social development, in which credit is an entry point. Initially, the focus was on financing self-employment in rural nonfarm activities, in which the landless have traditionally been involved; removing illiteracy and other social ills; promoting nutrition and good sanitary practices; and encouraging smaller family size. The food security of the poor was sought by generating additional income for the landless in

the rural nonfarm sector. But it has gradually moved in the direction of increasing food production by exploiting underutilized land and water resources (including programs for utilization of fallow land, crop diversification, restoration of idle irrigation equipment and underutilized government fisheries), and supplying agricultural inputs on credit and directly participating in farming activities, by setting up an independent nongovernment organization called Grameen Krishi Foundation (GKF).

This paper describes the grass roots organization that the Grameen Bank has developed, assesses the evolution of the Grameen Bank's involvement in agricultural development activities, and outlines the efforts of the GKF in introducing new crops and promoting the adoption of new technologies and improved farming practices.

Organizational development

Premise

The basic premise behind the development of Grameen Bank is the consideration that prevailing government institutions that follow the traditional top-down approach of delivery of services are ineffective and incapable of solving poverty in Bangladesh. It is, therefore, imperative to build grass roots organizations that can nurture people's creativity, initiative, and entrepreneurship, for full utilization of their potential to alleviate poverty. Grameen Bank is an attempt toward that end. Through trial and error during the first 6 yr of its experiment, it evolved into a nonconventional institution that is able to organize the poor, particularly the women, and bring them into mainstream economic activities (Hossain 1984, 1988, 1993; Funglesang and Chandler 1987, 1993).

The Grameen Bank is better described as an organizational development for participation (Funglesang and Chandler 1993). Dr. Mohamed Yunus, founder of the bank, explains the philosophy behind the Grameen Bank concept: "The most essential element I would emphasize in any development strategy is its focus on the human being. An integral part of the focus would be particular attention to the structure of institutions and organizations and the processes keeping them operational. I would promote organizational forms which help people achieve their potential. In doing so, I would focus particularly on the poorest, the bottom 50% of the population. The upper 50% are usually the beneficiaries of the existing institutions, practices, and processes. Creation of new institutions will either take some benefits away from the upper half or they will not see any new benefit in them. I would lay emphasis on creating local self-government institutions at the village level. The smaller the local government territory is, the better the chance for the poor to participate in decision making. No giveaways, no hand-outs. I would be tough in negotiating "prices" each community or individual should pay for services they receive from the institutions." (cited in Funglesang and Chandler 1993).

Credit as a key development input

The main constraint to increasing employment and income for the poor is that they lack access to capital for organizing economic enterprises. Generation of self employment

requires working capital and basic skills in reading, writing, and arithmetic. The poor are constrained in taking up such employment opportunities by lack of financial resources and necessary education and skills. The financial capital required may be small, but at very low levels of income, it is difficult to accumulate even small amounts. Although development of human capital is a long-term program, working capital can be provided to the poor through financial institutions.

But credit is rarely available to the poor at reasonable interest rates. Commercial banks fail to cater to the credit needs of the poor for three reasons. First, these banks require collateral, which the poor find difficult to provide. Second, their procedures and formalities for obtaining loans are too cumbersome for the illiterate poor. And third, commercial banks prefer handling large loans rather than the petty loans that the poor need.

The poor, however, have access to informal sources of loans: professional moneylenders known as *mohajons*, well-to-do-farmers, friends, and relatives. But these sources charge very high interest rates, usually 10% per month. The high interest rate severely limits the production activities that can be undertaken with the loans. Therefore, high-interest credit from informal sources basically finances consumption, for which the poor are forced to take very short-term loans when their physical existence is at stake.

Faced with shortage of capital, many nonfarm operators often borrow raw materials in kind from the moneylenders against the stipulation of compulsory delivery of output to the lender. Such transactions involve higher prices for raw materials and lower prices for output, compared with the market, and the implicit interest charges claim a large proportion of the potential income of the borrower.

Also, lack of capital sometimes forces the poor with necessary skills to organize nonfarm enterprises in "partnership" with the rich whose only involvement in the activity is the contribution of capital. The income obtained by the poor in such enterprises may not be higher than the imputed value of the family labor at the prevailing wage rate. Supply of capital at "reasonable" rates of interest could thus make a significant dent in the life of the rural disadvantaged groups.

An organization for appropriate credit delivery system

The Grameen Bank now follows standard operational procedures for delivery of credit, which evolved through experimentation during 1976-83 in a process of continuous interaction with the poor (Hossain 1988). A Grameen Bank branch normally covers about 15-20 villages located in a union, or at most two unions, in the vicinity of the branch. A person from a household that owns less than 0.2 ha of cultivated land, or assets with a value equivalent to less than 0.4 ha of medium-quality land, is eligible for a loan. Preference is given to a woman member of the household. Because most members of the target group are illiterate and are shy about coming to banks, the banking services are brought to their doorsteps. The size of the branch and the area covered are determined by the bank workers who travel daily to maintain contact with the target group.

Interested persons are asked to form groups of five like-minded people of similar economic standing who enjoy mutual trust and confidence. The bank has settled on a

group of five through trial and error. Male and female members form separate groups. Each group elects a chair and a secretary (these positions rotate among members yearly so that all members have the learning experience that accompanies the responsibilities of these positions). The chair is responsible for discipline in the group and for supervision of loan utilization by the members. Members conduct business with a bank worker, through the chair, at weekly meetings which all members must attend.

A number of groups from the same village are federated into a center, and the weekly meetings are held at the center level. Again, groups of male and female members form separate centers. The group chairs elect a center chief and a deputy center chief, who hold office for 1 yr only. Center chiefs ensure attendance at weekly meetings, payment of loan installments, and overall discipline; and conduct the program of the meetings. The bank worker attends the center meetings, and all bank business is conducted openly in the meeting, in front of the members.

Loans are given to individual members without any collateral. A borrower may use the capital in any productive activity of his choice, but the loan has to be used immediately, and the principal repaid in 50 weekly installments, each covering 2% of the loan amount plus interest. Initially, the bank charged 16% as the annual interest rate, the same rate other commercial banks in Bangladesh charged. The rate of interest was, however, raised in 1991 to 20% to cover the high cost of operation of this small-scale credit program.

Disbursement of loans is not a simple matter. When a group is formed, it is observed closely for a month by the bank worker to see if members are conforming to the rules of the Grameen Bank. Prospective borrowers are obliged to participate in a group training program for a minimum of 7 d of continuous instruction by the bank worker. The training is intended to make the members thoroughly conversant with the rules and regulations of the bank.

The group is accorded formal recognition when all members are found to be well versed in the bank rules and procedures. Two members of the group then receive loans; their loan-repayment behavior is observed for 2-3 wk. If they pay the weekly installments regularly, the next two members become eligible for loans. The group chair is the last member to receive a loan. No repeat loan is approved for any member until the previous loans are cleared.

The group ensures mutual accountability. The individual is kept in line by considerable pressure from other members of the group. The existence of the group thus acts as the collateral for the bank loans. The credibility of the group as a whole and its future benefits in terms of new loans are in jeopardy if one member breaks the discipline and defaults on loan repayments. Groups sometimes decide to fine or to expel a member who fails to attend a meeting and willfully defaults on payments. Other members of the group also extend financial support to a member in times of genuine difficulty when the member cannot pay. A member may leave the group when the loan is fully repaid. If a member leaves earlier, the responsibility for paying the balance falls to the remaining group members. When an entire group defaults, the responsibility for repayment falls to the center.

One of the regulations of the Grameen Bank is that each member save one Taka every week, in addition to 5% of the loan amount, which is kept aside at the time of disbursement. This amount is accumulated in the account called the Group Fund, which is

managed by the group on a consensus basis. When a member leaves the group, he or she is entitled to withdraw the savings accumulated in the Group Fund. Any group member can borrow from the Group Fund for any purpose, investment or consumption, at terms and conditions decided by the group. It is argued that the poor value credit from informal sources more highly than they value credit from formal financial institutions because they perceive the informal lenders as a permanent and reliable source available to finance consumption as well as production expenses. By creating the Group Fund, the Grameen Bank has ensured the same flexibility in its credit services as in the informal markets.

Credit as an entry point for social development

In 1984, the bank introduced a social development program called "Sixteen Decisions" to imbue members with discipline, unity, and hard work and to improve their living standard. These decisions include certain codes of conduct that members are encouraged to follow in their daily life, such as production of fruits and vegetables in kitchen gardens, improvement of housing and education of children, use of latrines and safe drinking water for better health, and rejection of dowry in marriages. Physical training and parades for both men and women are held at weekly center meetings, and the "Sixteen Decisions" are chanted as slogans. The bank management says that observance of these decisions, including participation in physical training and parades, is not compulsory. In the field, however, their observance has become a requirement for receiving a loan.

With the introduction of "Sixteen Decisions", the Grameen Bank has moved into an overall development program for the poor. Credit has been an entry point and now serves as a catalyst in the development process. The bank views the social development program as a key to the sustainability of the credit program. In the long run, better housing and sanitation, and increased consumption of vegetables and fruits, improve the health of the borrowers, increase their productivity and income, and hence ensure better recovery of loans. Kitchen gardens provide a regular source of income from which the borrower can partly finance the weekly loan repayments. Dowry constitutes the greatest risk of default in repaying loans, as the poor borrower is compelled to use capital to finance it. The bank is working hard to eliminate this social ill and the attendant economic burden on its members. Children's education is being promoted through active help in establishing center schools, distributing textbooks, and setting up children's savings funds, since basic skills in reading, writing, and arithmetic are required for increasing the productivity of labor.

Progress of the Grameen Bank

Within a decade since its establishment in 1983, the Grameen Bank has become a major development institution in Bangladesh. By March 1996, the bank has established 1,056 branches in almost every corner in the country, covering 35,644 villages, nearly 41% of the total villages in the country (Table 1). The bank has reached nearly 2.5 million house-

Table 1. Progress of Grameen Bank as of March 1996 (Source: Grameen Bank 1996a).

Indicator	
No. of bank branches	1,056
No. of villages covered	35,644
No. of households covered (000)	2,062
Amount of loans disbursed (US\$ million)	1,373
Amount of loans recovered (US\$ million)	1,164
Amount outstanding with borrowers (US\$ million)	209
Amount saved in Group and Emergency Funds (US\$ million)	110
Coverage of women	
Percent of members	94

holds. That constitutes 14% of all rural households in Bangladesh, and 28% of the households with less than 0.2 ha of land, who are the Bank's target group.

Grameen Bank has gradually turned into a bank for rural women. During the initial period of experimentation, only about 30% of the Grameen Bank borrowers were women (Hossain 1984). With experience, Grameen Bank has found women as more credit-worthy than men: they are careful in proper utilization of the loan and are regular in repayments. Also, access to capital provides women control over the household economic enterprises that are conducted with the assistance of other family members. The financial control contributes to the improvement of women's status in the household and empowers the women to participate in the household decision-making (Rahman 1986). That is the reason Grameen Bank has followed a policy of giving preference to women in extending credit, although in many cases the loan could be used by other members of the household to run family enterprises. In March 1996, about 94% of the Grameen Bank members were women who tapped 92% of the loans extended by the Bank.

The Grameen Bank has set Tk 5000 (US\$125) as the maximum amount for an individual loan. But a larger amount may be provided to a group or center for joint activities or collective enterprises for acquisition of technologies that require larger investment for increasing labor productivity and reaping economics of scale. The average size of loan received by the borrowers increased from Tk 1759 in 1984 to Tk 2845 in 1992. The small size of loan and the intensive supervision inherent in the credit delivery and monitoring system led to a high cost of operation which contributed to a large proportion of bank branches operating at a loss (Hossain 1988, Khandaker et al 1995). To increase the size of the business and thereby reduce operation costs, the Grameen Bank introduced in 1992 a seasonal loan program for agricultural operations with a larger ceiling, which can be repaid after harvest of the crop. The new policy contributed to an increase in the average size of the loans in 1994 to Tk 3554 for female borrowers and Tk 4120 for male borrowers.

The Bank has been successful in recovering more than 96% of its loan within due time. The key to the excellent recovery are (a) establishment of the mutual accountability system and peer pressure through the small informal groups, (b) financing the genuine

credit need of the borrower for profitable income earning opportunities as perceived by the borrower, (c) provision of loan for activities that generate regular incomes, (d) the procedure of collecting repayments in small amounts in weekly installments, and (e) development of an intensive management information system that keeps the management at different layers aware of the operations of the branch in the field.

The expansion of the Grameen Bank in terms of disbursement and recovery of loans, and accumulation of the members savings in Group Fund is shown Table 2. The cumulative amount of loans disbursed up to March 1996 reached US\$1.47 billion, of which US\$1.21 billion has been repaid by the borrowers. The annual disbursement of loans increased almost fourfold during 1991-93, mainly due to the introduction of the seasonal loans and the conscious effort of the bank to increase the size of business per branch to reduce its operation costs. The annual disbursement during 1995 reached US\$340 million, much higher than the total amount of rural credit delivered by all financial institutions in the country. The accumulation of savings in the Group Fund reached US\$108 million by the end of 1995, nearly 50% of the amount of outstanding loans with the borrowers. Thus, the Grameen Bank is able to finance a large part of its operations by utilizing the savings of its members in the Group Fund.

Involvement in crop production activities

The Grameen Bank members are drawn mostly from the landless and the marginal landowners. Early evaluation of the bank's operation showed that it was successful not only in confining its services to its target groups, but also in mobilizing the extreme poor within the target group (Hossain 1984). Only 3% of the member households owned land more than 0.2 ha in size, and 60% owned no more than the homestead land. The cultivation of land is thus marginal to the economic enterprises of the Grameen Bank borrowers. Also, the requirement that the members should repay the loans in regular weekly installments provides a built-in incentive to use the loans in activities that generates regular incomes.

During the early stage of the development of the bank, the loans were used mainly for rural processing and manufacturing, transport, and trading activities. With the expansion in the coverage of women borrowers, livestock and poultry raising (using resources within the homestead) became popular, as weekly installments could be paid from the sale proceeds of milk and eggs. Many members also invested the loan for fattening cattle, for sale during the Eid Festival when cattle are purchased by high-income households for sacrifice, and hence the market remains strong. The sluggish market for rural industrial products and the slow growth of rural incomes, however, led to a gradual decline in the proportion of loans taken for industrial and trading activities.

Table 3 shows changes in the pattern of the disbursement of Grameen Bank loans for activities grouped into broad sectoral categories. There was a dramatic increase in the share of crop production activities. During 1992 nearly a quarter of the loans were used for crop production activities; the share further increased to about 35% in 1994 after the introduction of the seasonal loans, which are taken mostly for agricultural activities. The Grameen Bank annual reports list 466 activities for which loans are taken by its members.

Table 2. Expansion of Grameen Bank (million Tk), 1983-95 (Source: Grameen Bank 1995).

Year	Loans disbursed	Loans recovered	Members' savings
1983	99	59	19
1984	304	199	44
1985	428	380	84
1986	542	466	137
1987	810	654	221
1988	1280	1014	352
1989	1768	1495	536
1990	2262	1989	779
1991	2640	2325	1075
1992	5204	3620	1499
1993	10622	7624	2336
1994	13912	12186	3372
1995	13664	13318	4330

Table 3. Changes in the pattern of disbursement of Grameen Bank loans, by sector, 1984-94 (% of total loans) (Sources: Grameen Bank, various years).

Sector	1984	1992	1994
Crop production	1.6	26.8	35.0
Livestock and fisheries	30.6	31.9	26.1
Trading and shopkeeping	32.9	21.4	22.4
Processing and manufacturing	22.2	18.8	15.5
Others	12.7	1.1	2.0
Total	100.0	100.0	100.0

The top 10 activities, however, account for nearly two-thirds of the total loans. The changes in the portfolio of these top 10 activities can be seen in Figure 1. In 1984 most of them were from the livestock, processing, and trading sectors. The list did not contain any crop production activity. But in 1994, the list included four crop production activities: rice cultivation, nonrice crop cultivation, land leasing, and tubewell irrigation. In 1994, the Grameen Bank issued US\$122 million for agricultural activities, of which US\$91 million was taken for those four activities. About 486,000 households borrowed money for rice cultivation, 307,000 for operation of shallow tubewells, 109,000 for leasing land, and 60,000 for purchase of fertilizers. The amount of loans for the purchase and operation of agricultural machinery is shown in Table 4.

How can the landless and the marginal landowners have the absorptive capacity for such huge investment in the crop sector which is supposed to be marginal to their economic enterprises? An in-depth impact evaluation study of long-term borrowers (Gibbons and Todd 1993, pers. commun.) suggests that Grameen Bank members can improve their access to land through purchase of small parcels and wider participation in the tenancy market. In Bangladesh, sharecropping is the predominant tenancy arrangement. Under share tenancy, the higher the yield of the crop, the higher the rent

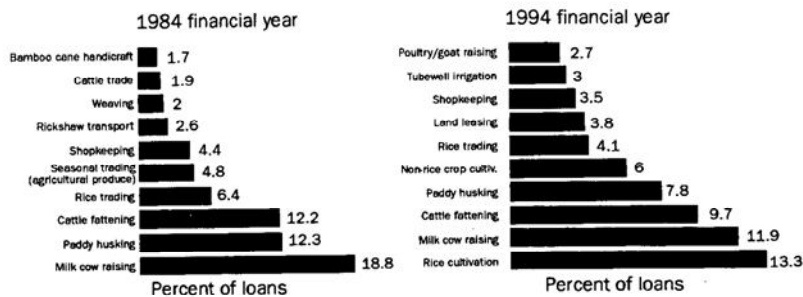


Figure 1. Changes in the portfolio of activities financed with Grameen Bank Loans, 1984 and 1994 (Source: Grameen Bank Annual Reports 1984 and 1994).

received by the landowner. To maximize the rental income, the landowner rents out land to households that have some land of their own and maintain a farm establishment, i.e., a pair of draft animals. This ensures that (a) the tenant has the necessary experience of efficiently managing the rented land, and (b) the tenant would apply labor and draft power to the maximum because of the low opportunity cost of underutilized capacity of the fixed establishment (family labor and draft animals). Thus, it is the small farmers who get preference over the landless in obtaining land from the tenancy market. The Grameen Bank has changed this pattern. Most Grameen Bank member households now own draft animals due to widespread use of the loan for livestock raising. The introduction of the modern varieties requires heavy investment in irrigation and chemical fertilizers. With improved liquidity, the Grameen Bank members are in a better position to make such investments than the small landowners. So, in the tenancy market, the land is now redistributed from small landowners to landless and marginal farmers who are Grameen Bank members. Also, many of the marginal landowners previously used to rent out their nonviable tiny holdings and work as agricultural laborers. Being Grameen Bank members, and having improved access to tenancy markets, they now have resumed self-cultivation of the holding. In this way, the Grameen Bank has made a great impact on associating the land-poor households in farming activities.

The Grameen Krishi Foundation

The Grameen Bank has also been making a conscious effort to extend modern agricultural practices to increase food production and achieve food security. This has been done by setting up an independent institution in 1991, known as the Grameen Krishi Foundation (GKF).

Table 4. Use of Grameen Bank loans for acquiring and operating of agricultural machinery and equipment, 1994. (Source: Grameen Bank 1995).

Machinery and equipment	No. of borrowers	Loans (000 US\$)
Shallow tubewells	306,742	26,490
Deep tubewells	822	155
Power pump	1,698	36
Hand tubewells/treadle pump	9,303	446
Power tillers	2,136	364
Threshing machines	202	37
Rice mills	2,259	272

The idea behind the setting up of GKF started with Dr. Yunus's experiment in the mid-1970s of introducing a three-share tenancy system in a village near the Chittagong University in place of the traditional 50:50 crop sharing tenancy. Under the three-share farm, the output is distributed as follows: the management committee responsible for inputs of water, fertilizer, and seeds is entitled to one-third of the harvest, the farmer gets one-third of the crop for his labor and draft power, and the landowner gets one-third of the crop for his contribution of land. The basic objective is to relieve the farmer of the direct management problem particularly in adopting new innovative technologies, the burden of mobilizing resources for investment in water and fertilizer which often acts as a constraint to the adoption of modern varieties; and to distribute the risk of crop failure among the tenant, the landowner, and the management committee, so that the adverse impact of natural disasters on the poor farmer is minimized.

The opportunity of testing this innovative land tenure arrangement on a larger scale came in 1986 when the government decided to de-invest the inactive government-owned deep tubewells to the Grameen Bank. This move led to the establishment of the Grameen Agricultural Project for managing the deep tubewells and fish farms bought from the government. To de-link its involvement in agricultural production from the credit delivery function and to develop an independent nonprofit organization in agriculture, the GKF was registered under the Companies Act in December 1991. The mandate of the Foundation is to organize the landless, the assetless, and the poor women to enable them to gain access to resources for their productive self-employment, and to encourage them to undertake income-generating activities to alleviate poverty and enhance their quality of life. The Foundation operates in the northwestern region of greater Rangpur, Dinajpur Bogra Tanguil, and Jamalpur, one of the most economically depressed regions in the country, and centers around the tubewells purchased from the government.

The main objectives of the Foundation are to (Rahman 1993)

- develop an efficient and planned irrigation infrastructure around a deep tubewell;
- reorganize agricultural system by working directly with the farmers;
- help small and marginal farmers by supplying modern agricultural inputs;
- bring fallow land under cultivation and contribute to more efficient utilization of land;
- introduce nontraditional crops and promote crop diversification;

- introduce modern technology and management system in agriculture;
- produce high-quality seeds and encourage farmers to use them;
- encourage farmers to practice sustainable agriculture, particularly through the adoption of integrated pest management;
- involve the Grameen Bank members, particularly women, in crop production and encourage them to adopt improved technologies;
- develop an efficient grain marketing system to alleviate the adverse impact of the fluctuation in foodgrain prices on poor farmers; and
- ensure food security of the vulnerable groups.

Given the existing socioeconomic structure in rural Bangladesh, the Foundation realizes that the irrigation system cannot be managed selectively only for the poor. Therefore, it accepts as a principle that the beneficiaries of its irrigation program would be all categories of farmers. The only change from the prevailing practices is that access to water will be provided more equitably, and the costs of other material inputs will be borne equitably. The Foundation mobilizes financial resources for agricultural investment and provides them to farmers in exchange for a share of the harvest. By taking over the responsibility of financing the modern agricultural inputs, and the management issues such as at what ratio different inputs have to be combined, the Foundation takes the risk of introducing a new technology out of the farmers, and eliminates the risk aversion factor that constrains the adoption of modern technology.

Irrigation-based modern agriculture is technology-centered and needs precise knowledge of the characteristics of natural resources and effective coordination among farmers for efficient operation. Practical operational questions are:

- How do we organize a large number of farmers who own land in small and scattered plots within the command area of a deep tubewell?
- How do we establish a trusting relationship among farmers so that they can participate in developing a joint crop production plan for efficient utilization of the resources?
- How do we develop a water management system that ensures equity among participating farmers and efficiency in the utilization of this scarce natural resource?
- What crops and varieties best suit the specific soil type and quality of the heterogeneous parcels of land under the command area of the tubewells?
- What should be the optimum quantity and timing of the use of seeds, fertilizers, and pesticides?
- What should be the allocation of land to different crops that would maximize farm income in view of the expected change in market conditions and relative prices?

These are momentous practical tasks requiring a variety of skills, knowledge and experience, and capacity for facilitation. These are the challenges that the Foundation has been attempting to address (Funglesang and Chandler 1993, Rahman 1993, Alam and Ali 1996).

The base of the Foundation's agricultural program is primary farm (PF). It consists physically of the land serviced by a deep tubewell, which is around 50-60 ha. The social organization to be formed for collaboration and collective decision-making within the PF

is conditioned by the incidental physical layout of the landholdings around the farm. The collection of people in a PF is highly heterogeneous (unlike in the organization of the Grameen Bank Credit Program), consisting of the elements in the entire social spectrum from big landowners to landless sharecroppers. They are brought together by the incidence of land layout, but maintaining cohesion within the group is difficult, as these traditionally diverse socioeconomic groups have conflicting interests and hidden social agendas that aim to benefit one at the expense of the other. This heterogeneity makes it extremely difficult to plan and implement an efficient agricultural development program.

The PF is managed by a farm manager who is an employee of the Foundation. The manager assists the farmers in preparing a farm plan through group discussions; prepares contractual arrangements with farmers for crop production, stipulating the assistance they need from the Foundation and the terms and conditions, and implements them; and encourages farmers to cultivate nontraditional crops, by leasing land to establish a demonstration plot. The manager is also in charge of developing and managing the irrigation infrastructure.

The farm manager is supervised by a unit office covering 8-16 PFs. The unit office approves crop production plans, mobilizes financial resources, procures inputs, and assists the farm manager in maintaining the irrigation equipment. The unit office is supervised by a regional office, which, in turns, reports to the GKF head office in Rangpur.

The GKF is still going through a learning process and has yet to demonstrate the kind of success that the Grameen Bank normal credit program has achieved.

Experiments are going on regarding the appropriate sharing arrangement of crops for providing inputs to farmers on credit. Before the establishment of the Krishi Foundation in 1991, the Grameen Bank used to provide inputs only for the cultivation of boro rice, and collected one-fourth of the produce for providing irrigation and one-third of the produce when the farmer also received seeds and fertilizers on credit. The Bank soon found out that under this arrangement, farmers underreported the yield and deprived the Grameen Bank its due share. The share rental was increased in 1992 to 30 and 40% respectively for providing irrigation only and irrigation + seed + fertilizers. Inputs on credit were also extended to other crops and the sharing arrangement was fixed in consultation with the farmers. Recently the GKF moved away from share rent to fixed-rent arrangement for single and multiple inputs (Alam and Ali 1996). Thus, the burden of crop failure has now been shifted entirely on the farmer. For the cultivation of boro rice, the rental share is as follows:

Seed	: 3 kg of rough rice for 1 kg of seed
Fertilizer	: 2 kg of rough rice for 1 kg of urea 2.75 kg of rough rice for 1 kg of TSP or potash
Irrigation	: 1/15 of rough rice harvested from irrigated area per season
Seed and fertilizer	: 1/6 of rough rice for 50 kg of seed, 210 kg of urea, 128 kg of TSP and 69 kg of muriate of potash per hectare
Seed, fertilizer, and water	: 2/3 of rough rice per hectare when the farmer receives all the inputs in the specified quantity

Considering that the average yield of boro rice is only about 6 t ha^{-1} , the rental share charged by the GKF appears too high to provide adequate incentives to farmers. For tenants, who have to pay 50% of the gross produce as rent to the landowners, this leaves only 10% of the produce as the share of his labor and draft power. The relatively low earning for the tenant's labor is a major constraint to accepting the services from the GKF. Farmers also complain about the high charge of irrigation and untimely supply of inputs (Rahman et al 1996).

Since 1995 the GKF has started a credit program for small farmers with landholdings of up to 1.2 ha. Already 30,000 members have been mobilized and loans amounting to Tk 100 million have been disbursed. Eighty percent of the members are women.

The GKF has had limited success in promoting crop diversification. It attempted to introduce new crops such as soybean, hybrid maize, and hybrid potato, but had difficulty convincing farmers to adopt them on a large scale. By 1995, only 4% of the land cropped under contract with the GKF could be brought under these new crops (Table 5). Nearly 90% of the land cropped was under rice and wheat. The main constraint to crop diversification has been the limited size of the market.

A recent evaluation of the impact of the GKF (Rahman et al 1996) showed that the GKF farmers reaped only marginal benefits. Table 6 summarizes the findings on costs and returns for the two major crops, aman and boro rice, for GKF and non-GKF farmers. The irrigation cost was higher for the GKF farmers, because GKF charges full cost of irrigation to the farmer, while those operating outside benefit from the subsidized irrigation under the government-operated systems. Providing credit for financing investment in chemical fertilizer did not make any impact at all. The fertilizer application rates were very high for both groups of farmers. The only positive impact was in the adoption of integrated pest management. The GKF farmers incurred 17-22% lower costs on pesticides than the control group. The GKF group had only marginally higher yield compared with the control, mainly due to the difference in labor use. The net returns from

Table 5. Allocation of land to different crops (% of cropped area) in Grameen Krishi Foundation compared with all Bangladesh (Sources: Alam and Ali (1996), BBS 1996).

Crop	Grameen Krishi Foundation (1994-95)	Bangladesh (1993-94)
Rice	85.4	72.2
Aus	0.0	12.0
Aman	29.6	41.4
Boro	55.8	18.8
Wheat	5.0	4.5
Maize	2.4	0.0
Sugarcane	2.4	1.3
Mustard	0.7	2.5
Soybean	1.1	0.0
Potato	0.5	4.2
Banana	0.2	0.3
Others	2.2	15.0
Total	100.0	100.0

Table 6. Costs and returns in the cultivation of modern rice varieties. GKF-supported villages compared with non-GKF area, Bangladesh, 1995-96 (Source: Rahman et al 1996).

Particular	Aman (wet season) rice			Boro (dry season) rice		
	GKF	Non-GKF	Difference (%)	GKF	Non-GKF	Difference (%)
Seed (kg ha ⁻¹)	676	677	0	733	685	7
Irrigation (Tk ha ⁻¹)	213	79	170	5,459	3,993	37
Fertilizer (kg ha ⁻¹)	222	222	0	348	369	6
Pesticides (Tk ha ⁻¹)	83	100	-17	195	251	-22
Labor (d ha ⁻¹)	148	144	3	173	163	6
Yield (kg ha ⁻¹)	3,022	2,928	3	4,797	4,677	3
Gross return (Tk ha ⁻¹)	17,418	16,877	3	24,482	23,120	6
Total costs of production (Tk ha ⁻¹)	8,913	9,298	-5	16,504	16,069	3
Farm operating surplus (Tk ha ⁻¹)	8,505	7,579	12	7,988	7,051	13

the cultivation of the crop was, however 12% higher for the GKF farmers compared with the control, partly due to higher prices of output received for the products. This benefit may have accrued from participation in the GKF's crop marketing program, and the reduced compulsion for selling the produce immediately after the harvest when the prices remain low.

Conclusions

Food security has two dimensions: (a) producing enough food to meet the growing demand, and (b) creating adequate purchasing power through productive and remunerative employment particularly for the low-income households to have access to the food (Sen 1981). The Grameen Bank tried to achieve the second component by developing a target group-oriented financial institution to provide access to credit to the land-poor households so that they could generate self-employment in economic activities of their choice. It developed an organization at the grass roots level to make the credit delivery system effective and to ensure the efficient utilization of the credit for sustainable income growth. Initially, the Bank financed nonfarm rural enterprises. But with the increases in income, the land-poor household accessed land through the tenancy market and started crop production activities, thereby indirectly contributing to food security. In 1994, 1.35 million households received US\$122 million from the bank to invest in crop production activities, 486,000 used the loan for rice cultivation, 307,000 for operation of irrigation equipment, and 109,000 for leasing land.

The Grameen Bank attempted to increase food production by establishing an independent Krishi Foundation for developing an efficient irrigation management system around the underutilized deep tubewells in the private sector. The Foundation has also been trying to promote modern agriculture by providing inputs in kind and management advice, in exchange of a share of the harvest. The basic objective is to take out of the

farmer the risk involved in adopting new crops and farming methods, and input-intensive technologies. But so far, it has had limited success in this endeavor. The Foundation is in a learning process of how to make it effective.

There is a vast potential of using the grass roots organization that the Grameen Bank and Krishi Foundation have developed to extend the knowledge-intensive natural resource management technologies to farmers: direct-seeding methods, efficient fertilizer use, appropriate production and postharvest mechanization, and by product utilization.

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