

Specific objectives during TFYP are:

- i) to provide timely and dependable supply of irrigation water for increased foodgrain production of 20.7 million tons;
- ii) to regulate and control floods and drainage, salinity, tidal water inundation and river erosion to avert crop and other material damages and human sufferings;
- iii) to generate productive employment opportunities for rural people in order to ensure equitable distribution of benefits of development;
- iv) to promote efficient use of water resources in respect of time and geographical area through interbasin water balances and optimal cropping pattern.

The irrigation targets in agriculture sector for the TFYP is to expand the irrigated area to about 39 lac hectares by the end of 1989/90 at annual growth rate 9.5% during TFYP as shown in Table IV-1-20. This will represent about 88% of the potential area (about 45 lac hectares).

2. Regional Background

2-1 General Conditions in Rajshahi Region

(1) Administrative System in Bangladesh

The country is divided into four administrative Divisions. Each Division is sub-divided into Regions and each Region is further sub-divided into zilas. After the administrative re-organization carried out in 1984, the country is now divided into 64 zilas. The newly created zilas are basically former sub-divisions. Each zila consists of several Upazilas and each Upazila consists of administrative system comprising a number of villages in rural area, and wards in the municipality in urban area as shown in Figure IV-2-1.

Bangladesh is governed by a unitary form of Government of presidential type. The President is the chief executive of the country. He has a council of ministries who assist him in the discharge of his duties. Four divisions are placed under four Division Commissioners and the administration of each zila is headed by a Deputy Commissioner who is assisted by other officials. Under the recognised set-up, Upazila is the focal point of public administration in the country, taking the administration to the door-step of the people and making it more responsive to the needs of the people and capable of providing quick decisions in solving local problems.

The administration of each Upazila is headed by an elected Upazila Chairman who is assisted by the Upazila Parishad (Councils), which is composed of the elected Union Chairmen and officers of the Upazila level department of each government development offices. Besides, it is noticed that he has the authority both to control and coordinate the activities of the members of the Upazila Parishad, although the Division Commissioner or Deputy Commissioner and Union Chairman has only the authority to coordinate.

This representative local government called the Upazila Parishad serves as the functional tie between the local administration with the will of the people and the national administration. Under this system, public administration has been made more responsive to the needs of the people.

The officials of most of the Government development departments have been deputed to the Upazila Parishads to help the Upazila Parishads function as administratively effective and viable local government. To have a clear delineation of the administrative and development responsibilities of the national government vis-a-vis the Upazila Parishad, it has been decided that while the national government has retained certain functions, the Upazila Parishads have been entrusted to perform all local level development activities.

The Upazila Parishads have thus become the focal point of all development activities at the local level programmes of their own on a reasonable scale and also the implementing authority for execution of the divisible components of national level projects and programmes. The Upazila Parishads should prepare a Five-Year Upazila Development Plan which will be reflected in the country's Five-Year Plan and for financial year they are also to prepare an Annual Upazila Development Programme.

The administration of each Union is the lowest local organization is headed by the elected Union Chairman who is also a constituent member of the Upazila Parishad. He is assisted by the Union Parishad, but he has only authority to coordinate the Parishads. The Union Parishad consists of three sections of Health & Family Planning, Agriculture and Livestock which are closely related with day-to-day life of the people. The officers of these sections also are that of Union level department of each government development offices and are placed for catering the daily needs of the rural people.

(2) Present Situation of Rajshahi Region

Rajshahi Region is located at the northwestern corner of the country. Rajshahi is the center of Rajshahi Division headed by a Division Commissioner. The development of Rajshahi Division has been left behind due to long-term flood damages, droughts and other geographical and socio-economic reasons.

Rajshahi Region consists of four Zilas, i.e., Naogaon, Natore, Nawabganj and Rajshahi, and includes 32 Upazilas, 297 Unions and 7,384 villages. In addition, it contains 4 municipalities and 238 Mohallas.

The total land area, population, number of farm households of this region are about 6% of whole country, as follows:

Land area	:	9,461 sq.km
Population	:	527 million
No. of households	:	866,000
No. of farm households	:	613,000

Population has increased rapidly at the rate of 3.0% per year on an average. This growth rate is higher than that of whole country and it requires urgent measures. The population density is 557 per sq.km., as shown in Table IV-2-1.

Agricultural indicators such as available land area, net cultivated area, and irrigated area per capita as well as average area of farm household are shown in Table IV-2-2. All agricultural indicators are higher than the country's averages. Therefore, Rajshahi Region is considered to be agricultural region in the country.

According to 1981 Population Census, the working population of more than 10 years old accounts to 1,300 thousand (male, 1,222 thousand), i.e., about 25% of the total population, and the employment rate is lower than the country's average. On the other hand, unemployment ratio, except for students and home workers, is 28% and higher than the country's average. Accordingly, the employment opportunities of this Region can be considered less than the whole country.

As regards occupation, agriculture is dominant and occupies about 70%. This proportion is about 10% higher than the country's average. However, the ratio has been suddenly decreased. On the other hand, service and other sectors have grown by 14% per year since 1974. (See Tables IV-2-3, IV-2-4, IV-2-5, and IV-2-6.)

According to agricultural census 1983-84, the number of farm households are 613,000, i.e., about 71% of the total number of households. Out of them, small-scale farmers (less than 1.0 ha) occupy 60%, medium-scale ones (1.0-3.0 ha) occupy 31% and large-scale ones (more than 3.0 ha) occupy 8%. Comparing with those proportion of the whole country, i.e., 70%, 15% and 5%, respectively, medium and large-scale farmers are in higher proportions in Rajshahi than in the country as a whole.

Looking over the share of operated area under each scale farmers, this fact is still clearer, i.e., that of small-scale, medium-scale and large-scale farmers is 21% (whole country, 29%), 45% (whole country, 45%) and 34% (whole country, 26%), respectively. (See Tables IV-2-7 and IV-2-8.)

According to the Land Occupancy Survey in 1977-78, on the other hand, own-holdings are 52% and owner cum tenant holdings are 47.5%. The results of the recent survey in Barnai area show that pure tenant farmers are less, viz., own-holding, 50%, owner cum tenant holding, 40%, and tenant farmers, 10%.

In Bangladesh, a "farmer" is defined as one who holds cultivated land more than 0.02 ha. Many non-farmers, according to the definition, are engaged in farming. "Landless" includes the small-scale farmers having less than 0.2 ha of agricultural land, and is classified into three categories as Landless I, II and III.

According to agricultural census 1983-1984, the landless in this region is 390,000 and occupy 45% of the total households. But the proportion is less than the country's average (49%). Landless I, which do not have house nor land are 54,000 (6% of total households); Landless II, which have house but no cultivable land, are 183,000 (21% of the total); and Landless III, which have both house and cultivable land up to 0.2 ha, are 156,000 (18% of the total). (See Table IV-2-9.)

This landless forms the poverty in rural area, and flows into urban area seeking the job opportunity. It causes the employment and housing problems in urban area. Therefore, it is very important to establish the governmental socio-economical policy to provide the employment opportunities and Basic Human Needs for them.

About 54% (whole country, 40%) of small-scale farmers having less than 1.0 ha are agricultural labourers, viz., their agricultural income is more than the income from other sources. Nearly half of the small-scale farmers are very close to landless. (See Table IV-2-10.)

The GDP in this region is Taka 21.6 billion (1984-85 current market price) and occupies about 5% of the whole country. This is lower than the proportions of land area and population. It is said that the economic power of this Region is relatively low, because the economic structure of it inclines more to agriculture compared with that of the whole country.

GDP per capita is Taka 3,379 (Taka 661 at constant price) which is 85% of that in whole country. The agricultural sector occupies 54% (whole country, 50%) but both large-scale and small-scale industry sectors occupy only 1% each (1984/85). This composition has not almost changed year by year either. The annual growth rate of the agricultural sector is 16% per year, on the other hand, that of whole sectors is 15% per year, so the growth of agricultural sector is just a little higher. Within the agricultural sector, the cropping sector is predominant and occupies 45% (85% of agricultural sector). The ratio of cropping sector has not changed through years. The livestock shows a rapid growth (refer to Tables IV-2-11 and IV-2-12).

The main social status in Rajshahi region is shown in Table IV-2-13.

Comparing with those indicators of the whole country, primary education enrolment rate and number of hand tubewells for drinking per 1,000 households are larger, but literary rate and diffusion of other social infrastructure have lagged behind.

2-2 Region Development Plan

The Government has been pursuing the policy of formulating the national land planning from the point of view which the integrated development planning in every regional area must be formed and implemented so as to promote the balanced economic growth among each region and to meet effectively the following problems:

- 1) fast growing population
- 2) rapid increase of population into urban area
- 3) development gap among regions
- 4) inefficiency accompanied with individual project by sector.

However, this view has recently been adopted in the regional planning. Accordingly, efforts for integrated development planning in the division, region or zila level are being made.

Developing in the context of agriculture and forestry has been proposed at the first stage mainly by Upazilas^{/*} based on which ministries concerned along with their local offices compile and finalize individual projects and implement them.

^{/*} ... Upazila Parishad should prepare a Five-Year Development Plan, which is reflected in the country's Five-Year Plan.

As mentioned above, agriculture is by far the most important sector in Bangladesh economy. Targets of agricultural sector were established to fulfill food self-sufficiency as well as the creation of additional labor opportunities equivalent to 70% of the total target (5 million laborer). Therefore, agricultural sector was allocated to be about 30% of national investment (Taka 114.6 billion) in order to alleviate local poverty.

This allocated amount was invested for the development as individual project budgets. For example, several irrigation projects among various areas have been implemented or planned in the irrigation sector for the purpose of expanding commandable area from the current level of 1.4 million ha to the target of 3.9 million ha in 1989/90 with the additional 1.4 million ha of newly created irrigable area. The irrigation project in the North Rajshahi is also a component of this national scheme.

3. Socio-economic Conditions of Project Area

3-1 Present Socio-economic Conditions

(1) General

The Study area, which consists of 39 unions and 1,412 villages, is administratively divided into five Upazilas, i.e., Niamatpur (in Naogaon Zila), Godagari, Paba and Tanore (in Rajshahi Sadar Zila), and Nachole (in Nawabaganj).

According to the population census in 1981, total production in the Study area is 792,063 persons and the population density is 457 persons per sq.km. The population density of Paba Upazila shows exceptionally high, i.e., 1,068 persons per sq.km. because this Upazila is adjacent to the divisional headquarters of Rajshahi. Excluding Paba Upazila, the population density of Barind Tract area in highland is 348 persons per sq.km, which is near the average of rural areas.

The total number of households in the Study area is 122,480. Out of them, the non-municipal population in dwelling unit in the Study area is 565,189 and the number of households is 99,586, i.e., 5.7 persons per household (Paba area 5.3, Barind area 5.7 persons). This figure is slightly less than the regional average and almost the same as the country's average. (See Table IV-2-1.)

The net cultivated land is 110,235 ha which occupy 64% of total land area and the ratio of farm households to total households is 66%, according to 1983-84 Agriculture Census. Both ratios show that the Study area is an agricultural area, however, the ratios are lower than those of the regional average. Except for Paba Upazila, the ratios of agricultural land area and farm household number to the total area and number of Barind area are 63% and 67%, respectively. These ratios are also lower than those of the regional average.

On the other hand, the available land area per capita is 0.22 ha (region, 0.17 ha) and the cultivable area per capita is 0.14 ha (region, 0.13 ha), which are higher than the regional averages.

The ratio of working population to the total population is 26% (male 47% and female 5%) which is higher than the regional average. Besides, about 73% of working population are engaged in agriculture.

In conclusion, the Study area is considered to have higher agricultural potentiality than the whole region. (See Table IV-2-1.)

(2) Population

The population of the Study area has increased rapidly. The annual average population growth rates were 3.7% between 1951-61, 3.9% between 1961-74, and 3.8% between 1974-81. Excluding Paba Upazila which was affected by population inflow to divisional headquarter Rajshahi, the rates of Barind area also were high, showing 3.9% between 1951-61, 3.5% between 1961-74, and 2.7% between 1974-81. Such a rapid population increase has been a major restrictive factor, therefore, effective measures should be enforced.

Out of the total population of 792,063, male population is 421,829 and female population is 370,234. The sex ratio is 114 which is higher than the regional average of 105.

In regard to age distribution, population below 14 years of age is 40% and from 15 to 64 years of age is 51%. Population of older than 65 years is 9% and the dependency ratio is 95. This dependency ratio is lower than the whole region of 102 and shows that the load of workers in the study area is higher than that of the whole region. Besides, the dependency ratio of Paba area is 86 compared with Barind area of 99. (See Table IV-3-1.)

(3) Employment

According to the population census of 1981, the working population of above 10 years of age is 135,493 (male, 122,615 and female, 12,878). The ratio of working population to total population is mentioned in item (1) above, however, the ratio to working population of above 10 years old is 39% (male 69% and female 7%). On the other hand, persons of no working and unemployment which is 2.3% of the total working population according to the labor force survey in 1983-84 are 25% of the population excluding students and home workers (male, 13% and female 69%). Both ratios show lower figures than those of regional average. (See Table IV-2-3.)

The occupations of working population are agriculture (73%), service (6%), and others (21%), excluding manufacturing which occupies only 1%.

In agricultural sector, cropping occupies a major portion (98% of total agriculture). It is noted that 42% of working female population is engaged in agriculture, which is higher than both the regional average (37%) and the country's average (28%). (See Table IV-2-5.)

3-2 Social Infrastructure

The main social infrastructure and the indicators are shown in Table IV-3-3.

As a whole, the social environment in the Study area is rather incongenial than that of the regional average. Both literary ratio and enrolment ratio are low. The social infrastructure such as drinking water supply facilities, number of beds in hospital, electrification, communication and culture has not been developed.

It is necessary to show non-arable land such as homesteads, water bodies and roads on the existing land use map of the Study area. Also, fruits and pasture lands have to be classified in the agricultural land.

Especially, there was no electrification in Niamatpur and Tanore Upazilas in 1982. Therefore, it is desirable that the Government enhances investment on its development.

It is necessary to show non-arable land such as homesteads, water bodies and roads on the existing land use map of the Study area. Also, fruits and pasture lands have to be classified in the agricultural land.

Table IV-1-1 Growth and Structure of GDP
(At 1971/73 factor cost)

(Unit: Tk. in crore)

Sectors	GDP of 1972/73	GDP of 1984/85	Annual Growth Rate (%)	Share of GDP of (%)	
				1972/73	1984/85
i) Agriculture	2,722.0	4,248.0	3.8	60.1	54.3
ii) Industries	329.8	676.8	6.2	7.3	8.6
iii) Other sectors	1,478.2	2,903.6	5.8	32.6	37.1
<u>Total</u>	<u>4,530.0</u>	<u>7,829.0</u>	<u>4.7</u>	<u>100.0</u>	<u>100.0</u>

Source: Third Five-Year Plan, 1985-90

Table IV-1-2. Sectoral Shares of Gross Domestic Product of Bangladesh
at current price

(Unit: Percentage)

Sectors	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86 (p)
1. Agriculture	46.7	45.9	47.1	48.4	50.1	51.6
i) Crops	35.9	35.8	36.2	37.1	36.9	37.8
ii) Forestry	2.5	2.4	3.0	3.4	3.3	3.4
iii) Livestock	5.3	4.8	5.1	4.8	6.4	6.8
iv) Fisheries	3.0	2.9	2.8	3.1	3.5	3.6
2. Mining & Quarrying	0.001	0.002	0.001	0.001	0.001	0.001
3. Industry	9.8	9.7	9.7	8.8	8.3	7.8
i) Large scale	5.7	5.6	5.4	4.9	4.6	4.4
ii) Small scale	4.1	4.1	4.3	3.9	3.7	3.4
4. Construction	5.6	6.0	5.2	5.2	5.4	5.5
5. Power, Gas, Water & Sanitary Services	0.3	0.4	0.6	0.6	0.6	0.5
6. Transport, Storage & Communication	7.9	8.6	8.7	7.4	6.5	6.0
7. Trade Services	8.9	8.3	8.0	8.1	8.4	7.9
8. Housing Services	7.6	7.4	6.8	7.1	6.7	6.4
9. Public Adm. & Defence	3.5	3.6	3.6	4.0	4.2	4.3
10. Banking & Insurance	1.8	1.6	1.5	1.5	1.6	1.6
11. Professional & Mis- cellaneous Services	7.9	8.5	8.8	8.9	8.2	8.3
12. GDP at Market Prices	100	100	100	100	100	100

Note: (P) -- Provisional

Source: B.B.S.

Table IV-1-2 Sectoral Growth Rate of Gross Domestic Product of Bangladesh at Constant Market Prices by Year to Year

(Unit: Percentage)

<u>Sectors</u>	<u>1980-81</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>	<u>1985-86</u> (p)
1. Agriculture	5.35	0.91	4.62	1.60	1.77	4.95
i) Crops	5.98	(-)6.7	4.93	1.13	1.18	5.25
ii) Forestry	7.85	10.51	1.86	9.29	8.30	8.33
iii) Livestock	2.51	5.84	2.36	1.86	2.35	2.32
iv) Fisheries	0.19	5.76	6.80	0.72	2.34	2.37
2. Mining & Quarrying	(-)0.75	100.0	(-)50.00	-	-	-
3. Industry	5.44	1.58	(-) 1.61	3.65	3.26	3.25
i) Large scale	7.30	0.71	(-) 4.90	4.32	3.51	3.50
ii) Small scale	2.99	2.77	2.82	2.80	2.96	2.93
4. Construction	13.39	5.59	1.13	20.11	12.22	4.32
5. Power, Gas, Water & Sanitary Services	11.11	18.40	53.04	7.06	8.45	9.70
6. Transport, Storage & Communication	2.76	0.14	7.73	2.18	2.60	5.15
7. Trade Services	1.25	(-)8.65	2.55	5.69	6.06	7.30
8. Housing Services	2.18	2.36	2.32	2.34	2.36	2.36
9. Public Adm. & Defence	75.76	6.62	(-) 0.41	20.68	13.31	8.16
10. Banking & Insurance	21.27	(-)6.87	(-) 5.65	5.82	19.67	7.31
11. Professional & Mis- cellaneous Services	5.89	6.42	6.51	6.76	6.70	6.74
12. GDP at Market Prices	6.78	0.81	3.61	4.23	4.12	5.15

Note: (P) -- Provisional

Source: 1) B.B.S.

2) 1986 Statistical Yearbook of Bangladesh

Table IV-1-3. Sectoral Growth Rate of Gross Domestic Product of Bangladesh at Constant Market Prices (Yearly)

(Unit: Percentage)

<u>Sectors</u>	<u>1980-81</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>	<u>1985-86</u> (p)
1. Agriculture	5.35	0.91	4.62	1.60	1.77	4.95
i) Crops	5.98	(-)6.7	4.93	1.13	1.18	5.25
ii) Forestry	7.85	10.51	1.86	9.29	8.30	8.33
iii) Livestock	2.51	5.84	2.36	1.86	2.35	2.32
iv) Fisheries	0.19	5.76	6.80	0.72	2.34	2.37
2. Mining & Quarrying	(-)0.75	100.0	(-)50.00	-	-	-
3. Industry	5.44	1.58	(-) 1.61	3.65	3.26	3.25
i) Large scale	7.30	0.71	(-) 4.90	4.32	3.51	3.50
ii) Small scale	2.99	2.77	2.82	2.80	2.96	2.93
4. Construction	13.39	5.59	1.13	20.11	12.22	4.32
5. Power, Gas, Water & Sanitary Services	11.11	18.40	53.04	7.06	8.45	9.70
6. Transport, Storage & Communication	2.76	0.14	7.73	2.18	2.60	5.15
7. Trade Services	1.25	(-)8.65	2.55	5.69	6.06	7.30
8. Housing Services	2.18	2.36	2.32	2.34	2.36	2.36
9. Public Adm. & Defence	75.76	6.62	(-) 0.41	20.68	13.31	8.16
10. Banking & Insurance	21.27	(-)6.87	(-) 5.65	5.82	19.67	7.31
11. Professional & Mis- cellaneous Services	5.89	6.42	6.51	6.76	6.70	6.74
12. GDP at Market Prices	6.78	0.81	3.61	4.23	4.12	5.15

Note: (P) -- Provisional

Source: 1) B.B.S.

2) 1986 Statistical Yearbook of Bangladesh

Table IV-1-4. Balance of Payments of Foreign Trade

(Unit: Crore Taka)

<u>Items</u>	<u>1978-79</u>	<u>1979-80</u>	<u>1980-81</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>
Current Account:							
Imports (F.O.B)	2307.8	3257.2	3925.5	4834.9	5172.9	5408.0	6122
Exports (F.O.B)	892.3	1150.8	1334.4	1454.5	1860.6	2051.5	2521
Freight & Insurance:							
a) On import	279.1	434.1	443.1	556.0	586.4	610.7	708
b) Earned	-	-	-	-	-	6.1	6
c) Net	-279.1	-434.1	-443.1	-556.0	-586.4	-604.6	-701
Other goods & services net							
	7.2	-16.7	61.3	54.5	-65.8	72.4	50
Balance	-1707.4	-2557.2	-2973.1	-3881.9	-3832.9	-3888.7	-4252
Investment:							
income net	-33.5	22.0	-37.0	-194.8	-259.0	-160.8	-172
Transfer by Bangla-							
desh nationals	217.7	325.0	619.6	772.5	1422.4	1376.2	1034
Grants, donations,							
etc. cash or kind	988.0	1129.0	1099.9	1359.8	1859.5	1840.9	1828
Deficit/surplus current account	-515.2	-1081.2	-1290.6	-1944.4	-810.0	-832.4	-1562
Capital Account:							
Aid and loan net	681.6	803.7	931.8	1487.0	1107.6	1385.5	1209
a) Long-term net	714.3	828.5	916.2	1070.6	1440.7	1213.2	1269
b) Short-term net	-33.7	-24.8	15.6	426.4	-333.1	172.3	-61
Other capital transactions							
	-43.9	-252.8	287.8	294.3	-457.4	-463.3	363
Errors and omissions	52.0	52.1	77.1	163.1	159.8	89.8	-10
Surplus on capital budget							
	515.2	+1081.2	+1290.6	+1944.4	810.0	832.4	1562

Note: Trade data may differ from those compiled by B.B.S.

Sources: a) Bangladesh Bank
b) 1986 Statistical Yearbook at Bangladesh

Table IV-1-5. Development Expenditure of the Government by Sector

Sectors	(Unit: Million Taka)							
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84 (Actual)	1984-85 (Estimated)
1. Agriculture	1642.83	3684.36	4719.34	4386.30 (17.8)	5968.57 (23.4)	3945.89 (16.2)	7497.13 (25.2)	10314.62 (26.6)
2. Industry	2399.31	2409.45	2625.86	3070.62 (12.4)	2225.18 (8.7)	1963.24 (8.1)	2872.78 (9.7)	2555.40 (6.6)
3. Flood Control & Resources	1539.16	1764.90	2682.87	4508.48 (18.3)	4219.31 (16.5)	4124.42 (17.0)	3381.89 (11.4)	6272.29 (16.2)
4. Rural Institution	422.20	744.59	865.18	916.13 (3.7)	912.50 (3.6)	662.59 (2.7)	452.52 (1.5)	743.04 (1.9)
5. Power & Natural Resources	1400.68	2131.08	3349.00	3672.62 (14.9)	4611.18 (18.1)	5354.89 (22.1)	7170.32 (24.1)	8770.03 (22.6)
6. Transport	1713.94	2282.13	3899.65	4448.92 (18.0)	3633.49 (14.2)	3183.12 (13.1)	3040.69 (10.2)	4295.65 (11.1)
7. Communication	484.31	369.61	770.32	662.42 (2.7)	786.87 (3.1)	697.90 (2.9)	766.91 (2.6)	1150.74 (3.0)
8. Education & Training	475.96	374.53	446.61	631.69 (2.6)	828.31 (3.2)	1009.51 (4.2)	1276.48 (4.3)	1375.35 (3.5)
9. Health	401.98	424.12	541.27	483.04 (2.0)	627.80 (2.5)	718.67 (3.0)	762.15 (2.6)	886.94 (2.3)
10. Population Control & Family	312.82	246.99	228.79	220.24 (0.9)	518.81 (2.0)	787.75 (3.2)	705.50 (2.4)	755.55 (1.9)
11. Physical Planning & Housing	804.49	877.34	1172.94	1114.91 (4.5)	466.18 (1.8)	1067.89 (4.4)	1074.50 (3.6)	832.74 (2.1)
12. Others/*	598.66	236.86	423.86	567.62 (2.2)	731.07 (2.9)	756.19 (3.1)	737.86 (2.4)	841.57 (2.2)
Total	12196.34	15545.96	21725.69	24682.99 (100)	25529.37 (100)	24272.06 (100)	29738.73 (100)	38793.92 (100)

Notes: /* -- Others include Social Welfare, Labour Training and Cyclone Re-construction, Science and Technology Research and Public Administration.

Figures worked out by B.B.S. may differ with those of ADP, Ministry of Planning since those are based on estimates.

Source: B.B.S.

Table IV-1-6. Main Economic Indicators (Yearly)

	<u>1980-81</u>	<u>1981-82</u>	<u>1982-83</u>	<u>1983-84</u>	<u>1984-85</u>	<u>1985-86</u>
Beet Growth Rate of GDP (%)	6.8	0.8	3.6	4.2	4.1	5.2
a) Agriculture	5.4	0.9	4.6	1.6	1.8	5.0
b) Industry	5.4	1.6	-1.6	3.7	3.3	3.3
Per Capita Income GDP at f.c. (TK)	754	743	750	762	776	798
Nominal Growth Rate of Export (%)		4.4	7.9	4.5	11.8	30.2
Nominal Growth Rate of Import (%)		22.2	3.9	16.9	12.4	34.2
Annual Rising Rate of Wholesale Price (%)	7.6	12.8	5.6	16.2	17.1	11.8
a) Agricultural Products	6.0	13.9	2.6	22.0	21.5	13.8
b) Industrial Products	11.2	10.4	10.9	6.3	8.4	8.1
Annual Increase Rate of Consumer Price	12.3	16.5	9.8	9.5	11.2	9.8
Nominal Growth Rate of Foreign Economic Assistance	-11.4	7.7	8.8	-5.8	-	
Investment as % of GDP (at current price)	16.0	15.0	13.6	12.3	13.3	12.7
Domestic Savings as % of GDP (at current price)	3.2	0.4	0.3	1.2	3.1	3.8
Government Resources (Million Taka)		48,436	57,017	66,806	71,634	77,027
a) Nominal Growth Rate of (%)			17.7	17.2	7.2	7.5
b) Internal Resources as a % of Total		53.3	46.7	46.3	52.6	48.2
c) External Resources of as a % of Total		46.7	53.3	53.7	47.4	51.8
Exchange Rate (TK per US\$1)				27.16	29.38	32.74

Source: 1986 Statistical Yearbook of Bangladesh.

Table IV-1-7. Main Social Indicators

Items	Indicators	Note
Population	Persons (in thousand) 100,468 (1985)	(1981) 87,120,119 persons (89,912,000 - adjusted)
Population Growth (annual)	2.8% (1985)	(1951-1961) (1961-74) (1974-81) 2.26% 2.48% 2.32%
Population Density	698 per sq.km (1981-85)	(1951) (1961) (1976) (1981) 300 356 496 605
Life Expectancy at Birth	Both sex 55.1 Male 55.6 Female 54.9 (1985)	(1982) Both sex 54.5 Male 54.5 Female 54.8
Primary Education Enrolment Rate	62.5 (1984)	(1982-83) Both sex 58.2 Male 71.1 Female 44.9
Literacy Rate of Population	Both sex 19.7% Male 25.8% Female 13.2% (1981) (to all ages)	(1981) Both sex 23.8% Male 31.0% Female 16.0% (to 5 years and above)
Hospital Beds per 1,000 persons	0.32 beds/1,000 persons (1985)	(1981) (1982) (1983) (1984) 0.29 0.28 0.29 0.31
No. of Potable Water Supply per 1,000 households	35 No./1,000 households (1981)	48,274 No. 619,859 No. (1981) (1985) (Total number of potable water supply)
No. of Villages with Electrification per 1,000 villages	76 No./1,000 villages (1985)	2,887 No. 6,507 No. (1981) (1985) (Total number of villages with electrification)
Availability of cloth (new) per capita	7.9 m (1985)	(1981) 6.8 m
Economic Activity Rate	Both Sex Male Female Clude 29.9% 53.4% 5.4% Refined 43.9 78.5 8.0 (1983-84)	(1981) Both Sex Male Female Clude 29.7% 54.4% 3.5% Refined 44.5 80.6 5.3
Economic Activity Rate by main occupation	Both Male Female Agriculture 61.3% 63.1% 28.0% Manufacturing 4.3 4.2 5.1 business 11.1 11.4 4.9 Others 23.3 21.3 62.0 (1981)	
Urban Population	Percentage 1961 5.2% 1974 8.8 1981 15.2 1985 17.4 Annual Growth Rate Population Labor Force 1961-74 6.9% 1974-81 11.2 4.4% 1981-85 7.2 5.7	
Not Working Rate	25.7% (1981)	
Wage Rate Indices (Base: 1969-70=100)	General Agriculture 1980/81 87 85 1981/82 86 86 1982/83 88 82 1983/84 90 75 1984/85 86 75 1985/86 95 82	Indices deflated by country CPI (Consumers Price Index)
Percentage of Under-nourished Population	below 1,600 kcal 21% " 1,800 " 40 " 2,200 " 71 (1981-82)	(1973-74) below 1,600 kcal 30% " 1,800 45 " 2,200 73

Source: 1986 Statistical Yearbook of Bangladesh and others.

Table IV-1-8. Production of Foodgrains

	1982/83		1983/84		1984/85	
	Area (['] 000 ha)	Production (['] 000 ton)	Area (['] 000 ha)	Production (['] 000 ton)	Area (['] 000 ha)	Production (['] 000 ton)
1. Rice						
Local	4,921	5,441	4,994	5,794	4,631	5,640
Aman HYV	1,074	2,042	1,064	2,017	1,080	2,165
Total	5,995	7,483	6,008	7,811	5,711	7,805
Local	2,683	2,095	2,683	2,180	2,472	1,891
Aus HYV	476	923	476	991	466	848
Total	3,159	3,018	2,159	3,171	2,938	2,739
Local	353	507	353	510	344	552
Boro HYV	1,080	2,983	1,080	2,787	1,230	3,295
Total	1,433	3,490	1,433	3,297	1,574	3,847
Local	7,957	8,043	7,980	8,484	7,447	8,083
Total HYV	2,630	5,948	2,620	5,795	2,776	6,308
Total	10,587	13,991	10,600	14,279	10,223	14,391
2. Wheat						
Local	21	20	19	18	20	19
HYV	498	1,058	507	1,174	656	1,422
Total	519	1,078	526	1,192	676	1,441
TOTAL	11,106	15,069	11,126	15,471	10,899	15,832

Source: 1986 Statistical Yearbook of Bangladesh

Table IV-1-9. Production of Major Agricultural Crops

(Unit: Lac ton)

	<u>1982/83</u>	<u>1983/84</u>	<u>1984/85</u>
Jute	8.72	9.13	9.13
Cotton (Lakh bales)	0.58	0.46	0.29
Sugarcane	72.42	68.50	67.69
Potato	11.31	11.48	11.41
Tobacco	0.50	0.47	0.49
Sweet Potato	7.02	7.02	6.72
Pulses	2.10	1.96	1.95
Oilseeds	2.49	2.63	2.66
Teen (Lbs)	902.47	930.31	835.50
Chillies	0.46	0.45	0.44
Vegetables	8.63	8.89	8.79
Fruits	14.70	13.83	14.15
Onion	1.38	1.34	1.38

Source: 1986 Statistical Yearbook of Bangladesh

Table IV-1-10. Food Self-Sufficiency

(Unit: 100,000 tons)

	<u>1982/83</u>	<u>1983/84</u>	<u>1984/85</u>
1. Population (10 million)	9.40	9.61	9.81
2. Grain requirement	148.60	154.60	163.00
3. Grain production	150.69	154.71	158.32
4. Foodgrain supply (net)	134.69	138.71	141.08
5. Deficiency	-13.91	-15.89	-21.82
6. Governmental management			
a) Storing	6.52	6.88	8.71
b) Domestic procurement	1.92	2.67	2.50
c) Foreign procurement	18.44	20.58	28.50
Sub-total	26.88	30.13	39.71
7. Distribution	19.35	20.51	27.00
8. Loss during storage	0.85	0.94	1.21
9. Storing quantity	6.88	8.68	11.50

Source: Statistical Yearbook of Bangladesh and others.

Table IV-1-11. Plan's Size and Outlay (1985-90) at 1984-85 Prices

(Unit: Crore Taka)

	<u>Plan Size</u>	<u>Actual Outlay</u>	<u>Percentage of Plan Size</u>	<u>Gross Aid Inflow</u>	<u>Percentage of Actual Outlay</u>
First Plan (1973-78)	4,455	2,074	46.55	1,491	71.89
Two Years Plan (1978-80)	3,861	3,359	87.00	2,481	76.84
Second Plan (1980-85)	17,200	15,297	88.94	9,708	63.46

Source: 1986 Statistical Yearbook of Bangladesh

Table IV-1-12. Macro-economic Changes in the Economy

<u>Macro-indicators</u>	<u>First Plan (1973-78)</u>	<u>Two-Year Plan (1978-80)</u>	<u>Second Plan (1980-85)</u>
1. GDP Growth (%)	6.1	3.5	3.8
2. Export Growth (%)	1.8	-3.2	4.9
3. Import Growth (%)	0.5	12.3	4.5
4. Foreign Aid Growth	-2.1	2.3	3.3
5. Investment as a % of GDP (Terminal Year)	13.5	15.9	17.3
6. Savings as a % GDP (Terminal Year)	4.6	4.2	4.2
7. Tax-GDP Ratio (Terminal Year)	7.5	8.0	8.2

Sources: The Third Five-Year Plan, 1985-90

Table IV-1-13. Achievement Rate of the Second Plan Physical Target

<u>Item</u>	<u>Unit</u>	<u>1984/85 Target</u>	<u>1984/85 Actual</u>	<u>Percentage of Achievement</u>
1. GDP	Annual Growth Rate	5.4	3.8	
a) Agriculture	-do-	5.0	3.6	
b) Industries	-do-	8.4	4.3	
2. Selected Physical Targets				
Foodgrains	(ml. metric tons)	17.5	16.1	-8.0
a) Rice	-do-		14.6	
b) Wheat	-do-		1.5	
Jute	(Million bales)	6.0	4.6	-13.3
Tea	(Million lbs.)	95.0	96.8	+ 1.9
Sugarcane	(Lakh tons)	77.6	70.0	- 9.8
Cotton	(Thousand bales)	56.0	12.0	-78.6
Tobacco	(Thousand tons)	57.7	54.0	- 6.4
Fish	(Lakh tons)	10.0	7.7	-23.0
Jute Textiles	(Thousand tons)	650.0	561.0	-13.7
Cotton Yarn	(Thousand lbs.)	183.0	130.8	-28.5
Fertilizer	(Thousand tons)	1,037.0	806.0	-22.3
Cement	(Thousand tons)	450.0	240.0	-46.7
Paper	(-do-)	93.0	90.0	- 3.2
Sugar	(-do-)	200.0	88.0	-56.0
Steel Ingots	(-do-)	225	101.0	-55.1
Generating Capacity	(MW)	1,342	1,018	-24.4
Gross-Generation	(GWH)	4,507	4,545	+ 0.8
Rural Electrification (Villages)		25,000	7,888	-68.4
Primary Education Enrolment (Lakh persons)		130	76	-41.5
Mass Education Enrolment (-do-)		440	7.0	-98.3

Source: The Third-Five Plan.

Table IV-1-14. Financing of TFYP Outlays at 1984-85 Prices

(Unit: Taka in Crore)

<u>Financing</u>	<u>Total</u>	<u>Percentage</u>	<u>Public</u>	<u>Percentage</u>	<u>Private</u>	<u>Percentage</u>
Plan size	38,600	100	25,000	100	13,600	100
Domestic	17,572	46	5,960	24	11,612	85
External	21,028	54	19,040	76	1,988	15

Source: 1986 Statistical Yearbook of Bangladesh.

Table IV-1-15. Sectoral Allocation of TFYP 1985-90 at 1984-85 Prices

(Unit: Crore Taka)

<u>Sectors</u>	<u>Public</u>	<u>Percentage</u>	<u>Private</u>	<u>Percentage</u>	<u>Total</u>	<u>Percentage</u>
1. Agriculture, Water Rural Development	7,060	28	4,400	32	11,460	29
2. Industries and Minerals	2,600	11	3,200	23	5,800	15
3. Energy and Natural Resources	5,675	23	500	4	6,175	16
4. Transport and Communication	3,025	12	1,500	11	4,525	12
5. Physical Planning Housing & Water Supply	550	2	3,650	27	4,200	11
6. Social and Economic Sector	6,090	24	350	3	6,440	17
Total	25,000	100	13,600	100	38,600	100

Source: 1986 Statistical Yearbook of Bangladesh

Table IV-1-16. GDP Composition (constant factor cost of 1984/85)

(Unit: Tk. in crore)

	<u>1984/85</u>		<u>1989/90</u>		<u>Annual Growth Rate (%)</u>
	<u>GDP</u>	<u>Share of GDP (%)</u>	<u>GDP</u>	<u>Share of GDP (%)</u>	
1. Agriculture	16,538	50.4	20,052	46.9	4.0
2. Industries	3,125	9.5	5,063	11.9	10.1
3. Gas and Electricity	238	0.7	376	0.9	9.6
4. Construction	761	2.3	965	2.3	4.9
5. Transport & Communication	1,722	5.2	2,407	5.6	6.9
6. Trade & Other Services	7,319	22.4	9,975	23.3	6.4
7. Housing Services	986	3.0	1,182	2.8	3.7
8. Public Services	2,145	6.5	2,690	6.3	4.6
Total	32,834	100	42,710	100	5.4
i) Domestic Savings as % of GDP	4.2		7.0		
ii) Investment as % of GDP	17.3		19.0		
iii) Tax-GDP Ratio (%)	8.2		9.4		

Source: The Third Five-Year Plan, 1985-90

Table IV-1-17. Major Sectoral Targets of TFYP

Items	Units	1984/85 (Actual)	1989/90 (Target)
Agriculture			
1. Foodgrains/1	ml. metric tons	16.1	20.7
(a) Rice	-do-	14.6	18.0
(b) Wheat	-do-	1.5	2.6
(c) Others	-do-	-	0.1
2. Jute	ml. bales	4.6	6.0
3. Tea	ml. lb	96.8	115.0
4. Sugarcane	lakh tons	70.0	82.0
5. Pulses/1	-do-	2.0	3.0
6. Oil Seeds	-do-	2.0	3.5
7. Potato	-do-	13.0	17.0
8. Fish/1	'000 tons	774	1000
Industries			
1. Jute Textiles	'000 tons	561	650
2. Cotton Textiles			
(a) Yarn	ml. kg.	59.4	95.0
(b) Cloth	ml. metre	771.0	1215.0
3. Fertilizer	'000 metric tons	806	21.50
4. Paper and Newsprint	-do-	90	105
5. Sugar	-do-	88	225
6. Cement	'000 metric tons	240	850
7. Basic Metals (Steel)	-do-	101	230
Energy			
1. Electricity			
(a) Generation	GWH	4545	899
(b) Sales	GWH	2840	7146
(c) Villages/1	'000 numbers	7.9	22.1
2. Gas			
(a) Output	MMCFD	450	750
(b) Customs Connections	'000 numbers	240	400
(c) Development Wells	Numbers	21	38
Transport and Communication			
1. Paved Roads	Km	4830	6118
PPH			
1. Rural Drinking Water Supply/1	'000 of hand tubewells/*	618.8	792.8
Education			
1. Primary School Enrolment /1	lakh students	89.2	116
2. Secondary Education Enrolment	-do-	24.8	27.5
3. College Education Enrolment	-do-	4.3	4.4
4. University Education Enrolment	'000 students	35.0	38.6
5. Technical Education Enrolment	-do-	20.4	22.0
6. Vocational Education Enrolment (including community schools)	-do-	554	756
7. Madrasa Education Enrolment	-do-	319	350
Health			
1. No. of Hospital beds /1	'000 numbers	27.6	40.7
2. No. of Doctors	-do-	16.0	22.5
3. No. of Nurses	-do-	6.5	10.2
Population Control			
1. Population Growth Rate	ln %	2.4	1.8
2. Contraceptive Prevalence Rate (CPR)	-do-	25	40

/* ... This includes shallow, deep and deepsat hand tubewells.

/1 ... Basic Needs Supplies (Output)

Source: Third Five-Year Plan (TFYP), 1985-90

Table IV-1-18. Employment Target

(Unit: lac of men-year)

<u>Sector</u>	<u>1984/85 (Benchmark)</u>	<u>1989/90 (Target)</u>	<u>Increase over Benchmark</u>	<u>Percentage of Increase</u>
1. Agriculture	116.4	150.6	34.2	67.2
2. Industries	19.0	24.3	5.3	10.4
3. Public Utilities	16.9	18.7	1.8	3.5
4. Construction	5.9	7.3	1.4	2.8
5. Public Services	20.0	25.2	5.2	10.2
6. Trade and Others	14.7	17.7	3.0	5.9
Total	<u>192.9</u>	<u>243.8</u>	<u>50.9</u>	<u>100</u>

Source: Third Five-Year Plan (1985-90).

Table IV-1-19. Projection of External Resources (1985-90)

	<u>Projection (1985-90)</u>		<u>Annual Growth (1985-90) (%)</u>
	<u>Core Taka</u>	<u>Million \$</u>	
A. Payments	45,989	17,688	
1. Imports (Goods)	38,160	14,677	2.8
2. Invisibles	6,066	2,333	
3. Debt Servicing	1,763	678	
B. Receipts	43,207	16,618	
1. Export (Goods)	13,998	5,384	4.9
2. Invisibles	4,566	1,756	
3. Remittances (net)	5,806	2,233	
4. Foreign Aid (gross)	18,837	7,245	3.1

Note: \$1.00= Tk. 26

Source: Third Five-Year Plan, 1985-90

Table IV-1-20. Irrigation and Flood Control Targets

(Unit: Area in lac hectares)

Name of Program	Benchmark (1984/85)		Target for TFYP (1989/90) Cumulative		Annual Growth Rate during TFYP over 1984/85 (%)
	Number	Area	Number	Area	
I. Irrigation					
A. Surface Water Irrigation:					
i) Gravity Flow		1.92		6.05	25.8
ii) LLP	48,000	7.12	60,000	8.50	2.6
a) 1-cusec	20,000	2.02	30,000	3.04	8.4
b) 2-cusec	28,000	5.10	30,000	5.46	1.4
iii) Traditional		3.44		3.24	-1.2
iv) Small Projects by Upazila Parishad				1.40	
Sub-total (A)		12.48		19.19	8.9
B. Ground Water Irrigation:					
i) STW	154,000	7.79	200,000	10.12	5.4
ii) DTW	17,000	4.13	30,000	7.28	12.0
iii) HTW	300,000	0.36	450,000	0.55	8.40
Sub-total (B)		12.28		17.95	7.9
C. Command Area Development					
Total (A + B + C)		24.76		39.04	9.5
II. Flood Control and Drainage					
		25.90		33.40	5.2

Source: Third Five-Year Plan, 1985-90.

TABLE IV-11. SELECTED BASIC INDICATORS

Zilla 1/ (Former Sub-division)	Upazila Within Study Area	Total Area 2/ Sq. km	Administrative Unit		Population 4/ 100.0	Net Cultiv- ated Area 5/ ha	Irrigated Area 6/ ha	Population Growth Rate 7/ %	Density of Population 8/ per sq km	Per capita		
			Union 3/ (Mouza)	(Village)						Per capita of Available Net Cultiv- ated Area	Per capita Net Cultiv- ated Area	
Nasirganj 11 Upazila 3,233 Villages	Kamarpur	448	8	(321)	152,252	31,304	6,250	2.4	340	0.29 5/ (0.73) 6/	0.21 (0.51)	
		Rajshahi Sadar	443	9	(389)	172,620	27,798	6,105	2.6	385	0.26 (0.64)	0.16 (0.40)
			262	12	(195)	279,871	17,776	3,033	5.9	1,068	0.09 (0.22)	0.06 (0.19)
		1,804 Villages	295	6	(212)	112,460	19,430	4,970	3.0	381	0.26 (0.65)	0.17 (0.43)
			1,005	27	(796)	564,951	65,004	14,108	4.2	562	0.18 (0.44)	0.12 (0.30)
		6 Up., 11,479 Vill.	279	4	(201)	74,860	13,927	1,885	3.0	268	0.27 (0.91)	0.19 (0.47)
			1,722	39	(1,318)	722,063	110,235	22,243	3.8	457	0.22 (0.54)	0.14 (0.35)
		Rajshahi Region (Former district) 4 Zilla Bangladesh	9,461	272	(6,384)	5,270,141	663,770	152,930	3.01	557	0.07	0.13
			460 Upazila 64 Zilla	143,998	4,792	(85,650)	87,119,965	9,157,786	1,620,309	3.22	605	0.13

Zilla 1/ (Former Sub-division)	Upazila Within Study Area	Percentage of Irrigated Area to Cultiv- ated Area	Total Households 9/ Number		Non-farm Households 10/ Number		Farm Households 11/ Number		Net Cultiv- ated Area as % of Total Area	No. of Farm- households as of total households	
			Operated Area	Average Area	Operated Area	Average Area	Operated Area	Average Area			
Nasirganj 11 Upazila 3,233 Villages	Kamarpur	30.6	29,140	31,916	1.2	8,234	20,906	(1.6)	69.9	71.7	
		Rajshahi Sadar	22.0	30,810	30,840	1.0	11,361	19,469	(1.6)	62.0	63.1
			17.1	29,888	21,365	0.7	10,420	19,268	(1.1)	67.8	64.9
		1,804 Villages	25.6	21,004	21,590	1.0	7,120	13,884	(1.6)	65.9	66.1
			21.7	81,502	72,795	0.9	28,881	52,621	(1.9)	64.9	64.6
		6 Up., 11,479 Vill.	20.2	12,668	15,304	1.2	4,325	8,163	(1.5)	49.9	55.3
			30.2	123,110	123,015	1.0	41,440	81,670	(1.5)	63.6	66.3
		Rajshahi Region (Former district) 4 Zilla Bangladesh	23.0	866,387	728,101	0.9	253,056	613,331	1.2	70.2	70.8
			19.9	13,817,646	9,316,171	0.7	3,772,347	10,045,299	0.9	56.7	72.7

Note: 1/ Source - 1986 Statistical Yearbook of Bangladesh
 2/ Total area - Area including reserve forest and river besides land area.
 3/ The smallest unit of the administrative organization is the Union.
 4/ Source - 1981 Population Census.
 5/ Source - 1983-84 Agricultural Census
 6/ Data has not got.

Table IV-2-2. Agricultural Indicators

<u>Items</u>	<u>Rajshahi Region</u>	<u>Bangladesh</u>
Per capita available of total area	0.17 ha	0.13 ha
Proportion of net cultivated area to total land	70%	57%
Per capita net cultivated area	0.13 ha	0.09 ha
Per capita irrigated area	0.03 ha	0.02 ha
Average area of farm household	1.2 ha	0.9 ha
Proportion of irrigated area to net cultivated area	23.3%	19.9%

Source: a) Upazila Statistics, Volume One.
b) 1983-84 Agricultural Census.

Table IV-2-3. ECONOMIC PARTICIPATION

Upazila	Total Population		10 years & above population		Economic participation 1/		Economic Activity Rate						Note		
	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female	B. sex %	Crude 2/ %	Male %		Female %	Refined 3/ %
Niamatpur	152,252	76,360	75,892	102,292	51,528	50,764	40,545	36,339	4,206	26.6	47.6	5.5	39.6	70.5	8.3
Godagari	172,620	87,725	84,895	116,413	59,217	57,194	44,435	40,346	4,089	25.7	46.0	4.8	38.2	68.1	7.1
Paba 4/	278,871	163,372	116,499	222,791	139,630	83,161	3,292	2,300	992	1.2	1.4	0.9	1.5	1.6	1.2
Tanore	112,460	56,127	56,333	74,353	37,177	37,176	29,091	26,586	2,505	25.9	43.4	4.4	39.1	71.5	6.7
Nachole	74,860	38,245	36,615	50,176	25,857	24,319	18,130	17,044	1,086	24.2	44.6	3.0	36.1	65.9	4.5
Total 5/ (Study Area)	792,063	421,829	370,234	566,025	313,411	252,614	135,493	122,615	12,878	25.8	46.6	4.7	38.5	69.2	7.0
Rajshahi 5/ (Region)	5,270,141	2,701,455	2,568,686	3,522,396	1,828,717	1,693,679	1,304,175	1,221,727	82,448	26.1	48.0	3.3	39.4	72.2	5.1
Bangladesh	87,120 (thousand)	44,919	42,201	58,169	30,287	27,882	25,907	24,425	1,482	29.7	54.4	3.5	44.5	80.6	5.3

Source = Bangladesh Population Census 1981, District: Rajshahi

Note = 1/ The economically active population is defined as persons age 10 years and above, who are either employed or unemployed during the reference period of the survey. It excludes recipients beggars and other persons who did not work for pay or profit for at least one hour during the reference week (according to 'Labour Force Survey 1983-84').

2/ Crude activity rate is the ratio of economically active population of ages 10 years and above to the total population expressed in percentage.

3/ Refined activity rate is the ratio of economically active population of ages 10 years and above to the population of the same ages expressed in percentage.

4/ It seems that there is some doubt as to number of economic participation in Paba Upazila.

5/ Economic activity rate is calculated excluding number of Paba upazila, because it is seemed that number of Paba Upazila is something wrong.

Table IV-2-4. STATUS OF NOT WORKING AND UNEMPLOYMENT

Upazila	Not working 1/		Unemployment 2/		Total		Population excluding students & household working (B)				(A) / (B)				
	Both sex	Male	Female	Both Sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female			
Niamatpur	10,069	3,530	6,539	1,042	727	315	11,111	4,257	6,854	50,614	39,869	10,745	22.0	10.7	63.8
Godagari	15,335	6,588	8,747	1,114	807	307	16,449	7,395	9,054	59,770	46,934	12,836	27.5	15.8	70.5
Paba	67,274	39,274	28,000	120	46	74	67,374	39,320	28,074	70,566	41,574	28,992	95.5	94.6	96.8
Tanore	8,727	3,562	5,165	720	532	188	9,447	4,094	5,353	37,818	30,148	7,670	25.0	13.6	69.8
Nachole	4,924	2,052	2,872	422	341	81	5,346	2,393	2,953	23,054	19,096	3,958	23.2	12.5	74.6
Total 3/ (Study Area)	39,055	15,732	23,323	3,298	2,407	891	42,353	18,139	24,214	171,256	136,047	35,209	24.7	13.3	68.8
Rajshahi (Region)	463,660	203,406	260,254	32,268	26,084	6,184	495,928	229,490	266,438	1,767,835	1,425,133	342,702	28.1	16.1	77.7
Bangladesh	(thousand) 7,237			600	489	111	7,837			30,470			25.7		

Source - 1) Bangladesh Population Census 1981. 2) Labour Force Survey 1983-84.

Note - 1/ This is obtained according to exclude students from the total of not working persons.

2/ 1) Unemployed persons are included in the economically active population and classified as unemployed if they are involuntarily out of gainful employment during the reference week, but are a) actively looking for employment in the past two months, or b) willing to work but not looking for work because they are temporarily ill or believed no work available.

2) The proportion of unemployment accounting for the economically active persons which are synonymous with the term civilian labour force is 2.3 percent in both sex, 2.0 percent in male and 7.5 percent in female on Bangladesh level (1981 Population Census) respectively.

3) These unemployed persons are obtained according to use the above percentage on Upazila and Region level, too.

3/ This is a numerical value excluding Paba because it is seemed that number of Paba Upazila is something wrong.

TABLE IV-1-5. ECONOMICALLY ACTIVE PERSONS BY MAIN OCCUPATION AND SEX

	Total		Agriculture						Forestry, Fishery & Livestock		Manufacturing		Business		Others		
	(Economically Active Persons)		Total		Cultivation		Forest, Fishery & Livestock		Manufacturing		Business		Others				
	Both sex	Female	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female	Both sex	Male	Female
Mianaspur	40,545 (100.0)	36,339 100.0	32,166 (79.3)	30,056 82.7	2,110 50.2	31,784 (78.4)	29,734 81.8	2,050 48.8	382 (0.9)	322 0.9	60 1.4	183 (0.5)	176 0.5	1,565 4.3	1,674 (4.1)	1,522 (16.1)	1,980 47.1
Godasari	44,435 (100.0)	40,346 100.0	28,980 (65.2)	27,548 68.3	1,432 35.0	28,286 (63.7)	26,887 66.6	1,399 34.2	694 (1.5)	661 1.7	33 0.8	191 (0.4)	186 0.5	3,479 8.0	3,479 (7.8)	11,785 (26.6)	2,421 59.2
Paba	3,282	2,300	1,185	917	268	233	219	14	952	698	254	1,861	1,137	0	0	246	0
Tanore	29,091 (100.0)	26,584 100.0	22,656 (77.9)	21,564 81.1	1,088 43.4	22,028 (75.7)	20,961 78.3	1,067 42.6	624 (2.2)	603 2.3	21 0.8	115 (0.4)	110 0.4	1,219 4.6	1,299 (4.4)	5,025 (17.3)	1,332 53.2
Nachole	18,130 (100.0)	17,004 100.0	12,109 (66.8)	11,785 69.2	324 29.6	11,997 (66.2)	11,686 68.6	311 28.5	112 (0.6)	102 0.6	10 1.0	131 (0.7)	128 0.7	1,288 7.1	1,288 (7.1)	4,602 (25.4)	690 65.5
Total (Study Area)	132,201 (100.0)	120,315 100.0	95,907 (72.5)	90,956 75.6	4,951 41.7	94,095 (71.2)	89,268 74.27	4,827 40.7	1,812 (1.3)	1,688 1.4	124 1.0	620 (0.5)	600 0.5	7,740 6.0	7,740 (5.9)	27,934 (21.1)	6,423 54.0
Pajshahi (Region)	1,304,175 (100.0)	1,221,727 100.0	924,145 (70.9)	894,007 73.2	30,138 36.5	900,067 (69.0)	873,317 71.5	26,750 32.4	24,078 (1.9)	20,690 1.7	3,888 4.1	18,647 (1.4)	17,100 1.4	108,500 8.3	112,022 (8.6)	249,361 (19.1)	47,241 57.3
Bangladesh	23,617 (100.0)	22,426 100.0	14,472 (61.3)	14,139 63.1	313 38.0	14,012 (59.3)	13,719 61.2	293 24.5	460 (2.0)	420 1.9	40 3.4	1,005 (4.3)	944 4.2	2,564 11.4	2,622 (11.1)	5,518 (23.3)	759 62.0

Source : 1) Bangladesh Population Census 1981. 2) 1986 Statistics Yearbook of Bangladesh.

Note : 1/ This is a numerical value excluding Paba because number of Paba Upazila is something wrong.

Table IV-2-6. Economically Active Persons 10 Years and Over by Agri and Non-agri Occupation 1961-83-84

Level	Occupation	1961		1974		1981		1983-84		Annual Growth Rate	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	1974-81	1974-83-84
Rajshahi	Agriculture	749,305	88.2	1,004,055	86.9	924,145	70.9			- 1.19	
	Non-agriculture	100,382	11.8	151,324	13.1	380,030	29.1			14.06	
	Total	849,687	100.0	1,155,379	100.0	1,304,175	100.0			1.75	
Bangladesh	Agriculture	(thousand) 15,000	86.0	15,838	77.2	14,472	61.3	16,448	58.81	- 1.29	0.40
	Non-agriculture	2,442	14.0	4,684	22.8	9,147	38.7	11,528	41.2	10.03	10.53
	Total	17,442	100.0	20,522	100.0	23,619	100.0	27,976	100.0	2.03	3.50

Source : 1) Bangladesh Population Census 1981, District : Rajshahi.

2) Labour Force Survey 1983-84.

TABLE IV-2-7. FARM HOUSEHOLD

Upazila	Household		Farm Household 2/					
	Total	Percent- age	Total	Small size group	Medium size group	Large size group		
	No.	%	No.	No.	No.	No.	%	
Niamatpur	29,140	100.0	20,906 (100.0)	9,332 (44.6)	8,675 (41.5)	2,899 (13.9)		
Godagari	30,180	100.0	18,839 (100.0)	7,926 (42.1)	8,415 (44.7)	2,498 (13.2)		
Paba	29,688	100.0	19,268 (100.0)	12,384 (64.3)	5,538 (28.7)	1,346 (7.0)		
Tanore	21,004	100.0	13,884 (100.0)	6,545 (47.1)	5,521 (39.8)	1,818 (13.1)		
Nechole	12,668	100.0	8,143 (100.0)	3,051 (37.5)	3,642 (44.7)	1,450 (17.8)		
Total (Study area) (A)	122,480	100.0	81,040 (100.0)	39,238 (48.4)	31,791 (39.2)	10,011 (12.4)		
Rajshahi (B)	866,387	100.0	613,331 (100.0)	370,008 (60.3)	191,662 (31.3)	51,661 (8.4)		
Bangladesh (C)	13,817,646	100.0	10,045,299 (100.0)	7,065,957 (70.4)	2,483,210 (24.7)	496,132 (4.9)		
(A) / (B)	14.1%		13.2	10.6	16.6	19.4		
(B) / (C)	6.3%		6.1	5.2	7.7	10.4		

Source : The Bangladesh Census of Agriculture and Livestock : 1983-84, Volume 1.

1/ Households of Bangla 1) Households within the municipal areas were excluded. 2) A household means a group of persons normally living together and eating in one mess (i.e with common arrangement of cooking) with their dependents, relatives, servant.

2/ Farm household: 1) Households with no operated land, no cultivated land and less than 0.05 acres of cultivated area were treated as non-farm households. 2) Farm households are broadly classified as (a) Small farm household is a farm holding having an operated area of 0.02 to 1.0 hectare of land. b) Medium farm household is a farm holding having an operated area of 1.01 to 3.03 hectares of land. c) Large farm household is a farm holding having an operated area of 3.04 and above hectares.

3/ Households and farm households within the municipal areas of Bangladesh there were 1,139 thousand, and 913 thousand households each.

Table IV-2-8. Number (in percent), Operated Area (in percent) and Average Area of Farm Household by Class of Holdings

Size	Rajshahi				Bangladesh				
	Number (Percentage)	Operated area (Percentage)	Average Size (ha)	Number (Percentage)	Operated area (Percentage)	Average size (ha)	Number (Percentage)	Operated area (Percentage)	Average size (ha)
ha	%	%	%	%	%	%	%	%	%
0.02 - 0.20	18.0	1.6	0.12	24.1	2.7	0.12	24.1	2.7	0.12
0.202 - 0.40	13.3	3.2	0.28	16.4	5.1	0.28	16.4	5.1	0.28
0.404 - 0.60	12.9	5.2	0.49	13.3	7.0	0.49	13.3	7.0	0.49
0.61 - 1.00	16.1	10.9	0.81	16.6	14.2	0.81	16.6	14.2	0.77
(Sub-Total)									
Small Farm	60.3	20.9	0.40	70.4	29.0	0.36	70.4	29.0	0.36
1.0 - 2.0	21.3	25.4	1.4	18.0	27.5	1.4	18.0	27.5	1.4
2.0 - 3.0	9.9	20.1	2.4	6.7	17.6	2.4	6.7	17.6	2.4
(Sub-Total)									
Medium Farm	31.2	45.5	1.7	74.7	45.1	1.7	74.7	45.1	1.7
3.0 - 4.0	3.7	10.7	3.4	2.3	8.6	3.4	2.3	8.6	3.4
4.0 - 6.0	3.2	12.7	4.7	1.8	9.2	4.7	1.8	9.2	4.7
6.0 - 10.0	1.3	7.8	7.2	0.6	5.4	7.2	0.6	5.4	7.3
10.0 above									
(Sub-Total)									
Large Farm	8.4	33.8	4.8	4.9	25.9	4.9	4.9	25.9	4.9
T O T A L	100.0	100.0	1.2	100.0	100.0	0.9	100.0	100.0	0.9
			(0.8) 1/			(0.7) 1/			

(Note) 1/ Average size (including number and operated areas of non-farm households)

Source = The Bangladesh census of agriculture and livestock, 1983-1984 volume 1.

TABLE IV-2-9. LANDLESSNESS

Upazila	All Households	Households of Landlessness I/ Classified							
		Landless I		Landless II		Landless III			
		Number	Percent %	Number	Percent %	Number	Percent %		
Niamatpur	29,140	1,614	5.5	6,225	21.4	3,265	11.2	11,104	38.1
Godagari	30,810	3,005	9.8	7,904	25.6	3,282	10.7	14,191	46.1
Paba	29,688	2,494	8.4	7,115	24.0	6,332	21.3	15,941	53.7
Tanore	21,004	932	4.4	5,667	27.0	2,307	11.0	8,906	42.4
Nachole	12,468	3,304	26.5	3,342	26.8	1,278	10.3	7,924	63.6
Total (Study Area)	123,110	11,349	9.2	30,253	24.6	16,464	13.4	58,066	47.2
Rajshahi (Region)	866,287	53,711	6.2	182,677	21.1	155,615	18.0	392,203	45.3
Bangladesh	13,817,646	1,198,056	8.7	1,965,002	14.2	3,668,315	16.5	6,831,373	49.4

Source : The Bangladesh Census of Agriculture and Livestock : 1983-84.

Note : 1/ Landless I means households owing no land whatsoever. 2/ Landless II stands for households holding homestead but no cultivated (operated) land. 3/ Landless III stands for households holding homestead land and upto 0.2 ha (0.5 acre) of cultivated (operated) land in addition to homestead land.

2/ The households of Landless II and III include that of owning no land (homestead land). But number of households owning no land is not divided into classes on the statistics by Upazila. Accordingly, the number of households owning no land of Landless II and Landless III is estimated by using the respective ratio of households owning no land to households holding homestead land and no cultivated and upto 0.2 ha cultivated land on statistics of Rajshahi Region.

TABLE IV-2-10. PERCENTAGE OF AGRICULTURAL LABOUR HOUSEHOLDS BY REGION

	Agricultural Labour Households as percent of					
	Total Households %	Non-farm Households %	Farm Households %	Small-farm Households %	Medium-farm Households %	Large-farm Households %
Bangladesh	39.8	63.0	31.1	40.9	8.9	1.3
Bandarban	35.8	60.6	28.1	45.7	19.8	4.4
Chittagong	30.3	38.4	24.4	28.1	10.6	2.8
Chittagong H.T.	30.6	37.0	29.1	42.2	20.5	5.2
Comilla	37.0	57.3	31.6	36.1	8.0	2.6
Noakhali	35.2	56.9	29.0	32.7	11.9	1.9
Sylhet	40.4	62.8	32.6	43.6	12.6	1.4
Dhaka	33.0	42.2	28.2	33.9	7.8	1.7
Faridpur	46.0	70.3	39.6	51.7	12.1	1.5
Jamalpur	43.6	76.9	28.8	39.8	3.7	1.0
Mymensingh	41.7	75.7	28.0	38.4	4.6	0.8
Tangail	37.1	61.2	30.2	38.9	8.4	2.6
Barisal	39.4	64.9	32.0	39.6	9.6	1.4
Jessore	40.2	66.4	32.8	50.0	9.3	0.9
Khulna	44.5	63.4	38.6	52.2	14.9	1.1
Kushtia	42.2	63.4	33.6	49.1	10.0	1.2
Patuakhali	35.6	67.4	25.5	35.8	6.4	0.8
Bogra	39.1	72.0	27.4	37.3	3.6	1.0
Dinajpur	41.2	78.9	26.0	45.4	6.6	0.7
Pabna	38.8	54.5	31.1	43.7	9.0	1.4
Rajshahi	44.3	71.6	33.0	49.9	9.2	0.8
Rangpur	46.4	79.9	32.1	45.3		

Note: Definition of agriculture labour households: Agricultural labour households consist of those households whose main source of income is obtained from agricultural labour. Agricultural labour was defined as agricultural work which might be done by any member(s) of the household in the farms of other households for wages in cash or kind.

Source : The Bangladesh Census of Agriculture and Livestock:1983-84, Volume 1.

TABLE IV-2-11. GROSS DOMESTIC PRODUCT AT CURRENT PRICE IN RAJSHAHI

Sectors	1980-81	1981-82	1982-83	1983-84	1984-85
1. Agriculture:					
i) Crops	6,551 (52.8)	7,492 (53.1)	7,854 (53.0)	9,735 (53.7)	11,824 (54.8)
ii) Forestry	5,588 45.1	6,399 45.2	6,515 44.0	8,323 45.9	9,557 44.3
iii) Livestock	34 0.3	38 0.3	49 0.3	65 0.4	73 0.3
iv) Fisheries	734 5.9	843 6.0	1,025 6.9	1,148 5.8	1,786 8.3
2. Mining and Quarrying:	195 1.5	212 1.5	265 1.8	299 1.6	408 1.9
3. Industry					
i) Large Scale	322 (2.6)	363 (2.6)	398 (2.7)	438 (2.4)	491 (2.3)
ii) Small Scale	165 1.3	184 1.3	194 1.3	215 1.2	242 1.1
4. Construction	157 1.3	179 1.3	204 1.4	223 1.2	249 1.2
5. Power, Gas, Water and Sanitary Ser	759 (6.1)	920 (6.5)	871 (5.9)	1,049 (5.8)	1,305 (6.0)
6. Transport Storage and Communication	18 (0.1)	23 (0.2)	49 (0.3)	57 (0.3)	67 (0.3)
7. Trade Services	935 (7.5)	1,050 (7.4)	1,142 (7.7)	1,178 (6.5)	1,235 (5.7)
8. Housing Services	1,086 (8.8)	1,170 (8.3)	1,167 (7.9)	1,460 (8.1)	1,792 (8.3)
9. Public, Admn & Defence	1,028 (8.3)	1,135 (8.0)	1,131 (7.7)	1,442 (8.0)	1,623 (7.5)
10. Banking and Insurance	492 (4.0)	950 (6.7)	624 (4.2)	846 (4.7)	1,071 (5.0)
11. Professional and Misc. Ser	255 (2.1)	257 (1.8)	271 (1.8)	316 (1.7)	417 (1.9)
12. GDP at current market Prices	950 (7.7)	1,163 (8.2)	1,309 (8.8)	1,598 (8.8)	1,766 (8.2)
13. Indirect Tax, net of subsidies	12,396 (100.0)	14,143 (100.0)	14,816(100.0)	18,119(100.0)	21,591(100.0)
14. GDP at current factor Cost	813	835	934	1,141	1,318
Population (in Million)	11,583	13,308	13,882	16,978	20,273
Per Capita GDP at factor Cost (Taka)	5.41	5.56	5.70	5.86	6.00
	2,141	2,394	2,435	2,897	3,379

Source: 1986 Static Yearbook of Bangladesh.

TABLE IV-2-12.
GROSS DOMESTIC PRODUCT AT CONSTANT PRICE 1984-85

(Tk. in Million)

Sectors	Rajshahi %	Bangladesh %	Bangladesh 1985-86(P) %
1. Agriculture	2,240 (53.1)	38,105 (46.9)	39,990 (46.8)
i) Crops	1,895 44.9	29,463 36.3	31,010 36.3
ii) Forestry	16 10.4	2,269 2.8	2,458 2.9
iii) Livestock	262 6.2	3,927 4.8	4,018 4.7
iv) Fisheries	67 1.6	2,446 3.0	2,504 2.9
2. Mining & Quarrying	- (-)	1 (-)	1 (-)
3. Industry	115 (2.7)	8,132 (10.0)	8,396 (9.8)
i) Large Scale	57 1.3	4,544 5.6	4,703 5.5
ii) Small Scale	58 1.4	3,588 4.4	3,693 4.3
4. Construction	237 (5.6)	4,095 (5.0)	4,272 (5.0)
5. Power, Gas, Water & Sanitary Services	15 (0.4)	526 (0.6)	577 (0.7)
6. Transport, Storage and Communication	248 (5.9)	5,480 (6.8)	5,762 (6.8)
7. Trade Service	368 (8.7)	7,210 (8.9)	7,736 (9.1)
8. Housing Services	337 (8.0)	5,812 (7.2)	5,949 (7.0)
9. Public Admn. & Defence	240 (5.7)	3,968 (4.9)	4,292 (5.0)
10. Banking & Insurance	93 (2.2)	1,545 (1.9)	1,658 (1.9)
11. Professional & Misc. Ser.	325 (7.7)	6,339 (7.8)	6,766 (7.9)
GDP at constant market prices	8,218(100.0)	81,213(100.0)	85,399(100.0)
Indirect Tax net of Subsidies	255	4,224	4,261
GDP at constant factor cost	3,963	76,989	81,138
Population (In Million)	6.00	99.2	101.7
Per capita GDP at factor cost (in Taka)	661	776	798

Source: 1986 Statistical Yearbook of Bangladesh

Table IV-2-13. Main Social Indicators

<u>Item</u>	<u>Literacy Rate</u>	<u>Primary Education Enrolment Rate</u>	<u>Attend- ance Rate</u>	<u>Per 1,000 H.H Hand Tubewells for Drinking</u>	<u>No. of Villages with Elec- trification per 1,000 Villages</u>	<u>No. of Households with Elec- trification per 1,000 H.H.</u>
	17.1% (23.3)	65.5% (75.5)	18.3% (20.1)	55 No.	82 Villages	27 H.H.

Source: a) 1981 Population Census
b) Rajshahi District Statistics, 1983

Note: Figures in parentheses are percentage of male.

TABLE IV-3-1. D E P E N D E N T R A T I O

Ages Group	Total	0 - 14	15 - 64	65 +	Dependent Ratio	
					(0-14+)	(65+) Ratio
Upezila						
Niamatpur	152,252	69,712	78,256	4,282	73,996	95
Godagari	172,620	82,415	85,639	4,566	86,981	102
Paba	279,871	74,541	150,110	55,220	129,761	86
Tanore	112,460	53,779	55,747	2,934	56,713	102
Nachole	74,860	35,880	37,132	1,848	37,728	102
Total	792,063	316,327	406,884	68,852	385,179	95 *1
Rajshahi	5,270,000	2,460,000	2,606,000	204,000	2,664,000	102
Bangladesh	87,120,000	40,601,000	43,564,000	2,955,000	43,556,000	100

Note : *1 Dependent Ratio in Barind Area is 99.

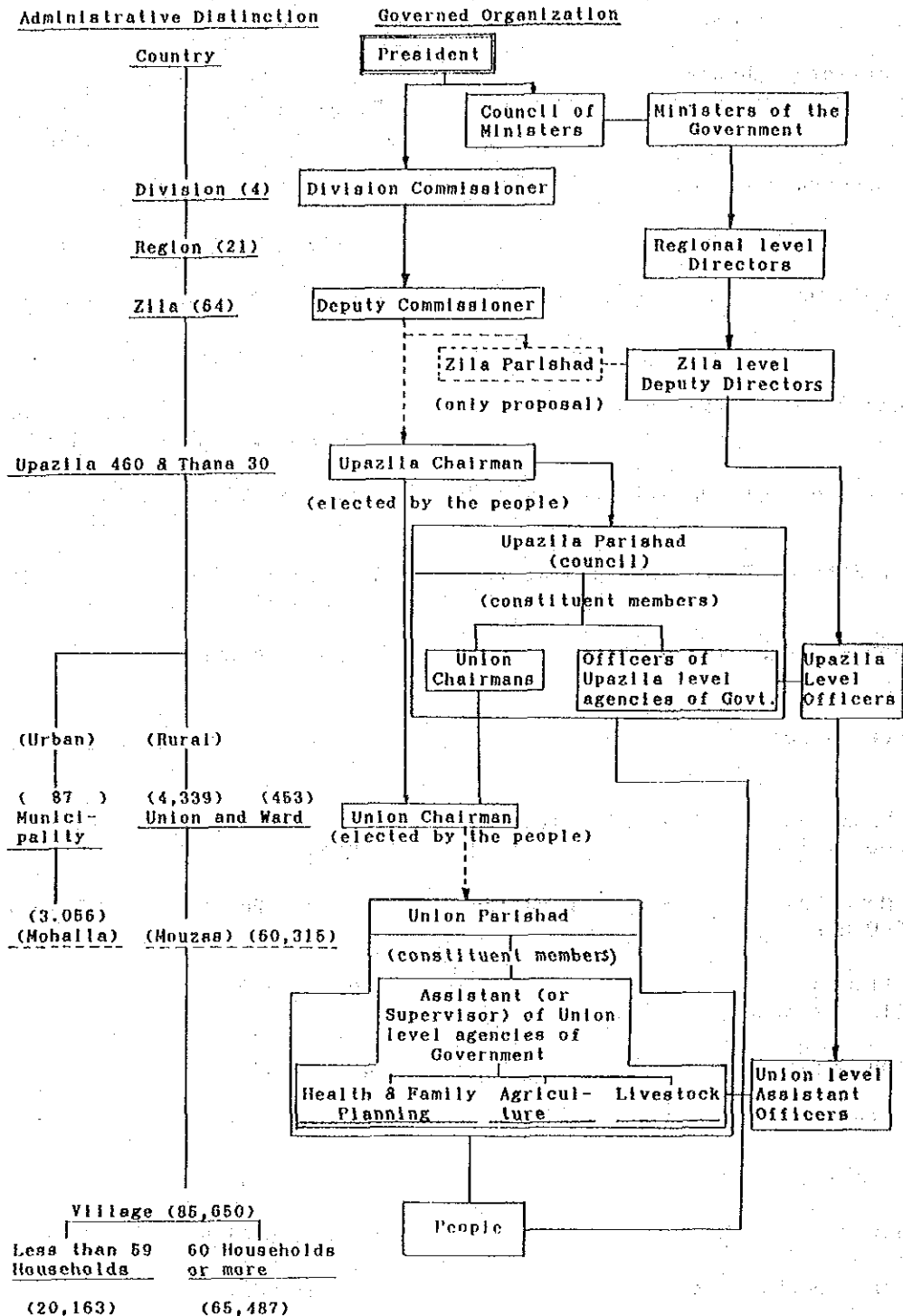
Source: Bangladesh Population Census.

Table IV-3-2. Main Social Infrastructure

<u>Items</u>	<u>Indicators</u>
No. of Primary schools	Number: 343 Students: 81,765 Students per school: 238 persons (1985-86)
No. of Secondary schools	Number: 79 Students: 22,677 (1985-1986) Enrolment Rate: 19.8% (1982-83)
No. of Colleges	Number: 10 Students: 4,457 (1985-1986) Enrolment Rate: 1.4% (1982-83)
Enrolment Rate of Primary schools	Both Sex: 57.2% Male: 61.0% Female: 53.1% (1982-83)
Attendance Rate of Population 5 to 9 yrs.	Both Sex: 21.8% Male: 23.0% Female: 20.7% (1981)
Literary Rate of Five Years and above	Both Sex: 18.1% Male: 24.7% Female: 10.1% (1981)
Per 1,000 H.W Hand Tubewells for Drinking	32 No./1,000 H.H (No. 3,914) (1982)
Per 1,000 Persons Hospital Beds	0.06 Beds/1,000 persons (No.44) (1982)
No. of Villages with Electrification per 1,000 Villages	26 Villages/1,000 Villages (No.36) (1984)
No. of Households with Electrification per 1,000 H.H.	25 H.H/1,000 H.H (No. 3,105) (1982)
Post Officers (including branches)	46 (1984)
Telegraph Officers	4 (1984)
Public Libraries	4 (1984)
Bank Branches	51 (1984)
Daily Bazar	7 (1984)
Weekly or biweekly hats	86 (1984)

Source: District Statistics (1983), Zila Statististics (1987), Rajshahi

Figure IV-2-1. ADMINISTRATIVE CHART OF BANGLADESH



Source : 1986 Statistical Yearbook of Bangladesh and others.

Note : 1) See Appendix-E, Figure

2) On chart of governed organization, → shows to have authority of both control and coordinate, and ---→ shows to have only authority of coordinate.

APPENDIX V

AGRICULTURE AND FARM ECONOMY

APPENDIX V

AGRICULTURE AND FARM ECONOMY

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1 Present Condition of Agriculture

1-1 Crop Production

The study area includes five upazilas out of which four are mainly situated in Barind Tract (Barind area) and one (Paba) in flood plain. Part of Paba and Nachole, and most of the other three upazilas are located in the study area. Crop production in the study area will be described in terms of the upazila statistics and based on the situation of the two areas.

1-1-1 Crop Area

Each crop area and its percentage to total cropped area in these upazilas are shown in TABLE V-1-1 and V-1-2 respectively. Rice occupies 90% or more of total cropped area in Barind area, while rice and non-rice crops cover 50 and 50% in Paba area where sugarcane, jute and other dry land crops are predominant. Within rice, transplant aman (T.aman) is the main crop in Barind but in Paba aus represents the highest percent area. These are attributed to the difference in soil property between the two areas and severe lack of water in Barind area during the dry season.

1-1-2 Crop Yield

Average yields of rice by upazila and the area are shown in TABLE V-1-3. There are significant difference in yield between local varieties (LV) and modern varieties (MV), then yields are shown separately and in average of LV and MV with percent area. As the yield of MV is higher than LV, higher average yields of aus and others are primarily attributed to higher percent area of MV except for boro in Paba owing to lowest yield of LV and MV. Both in LV and MV of rice, yield of boro is highest and aus lowest, and yield of broadcast aman (B.aman) in which there is only LV situates between that of T.aman (LV) and aus (LV). There may be no substantive difference in yield between Barind and flood plain (Paba) except for boro. Average yield of total rice is 1.3t/ha which is generally at low level due to damage and other reasons.

Average yields of non-rice crops are summarized in Table V-1-4. In most of these crops, yields are higher in Paba area than Barind area. The main reason is that soil property in Paba area must be suitable for these crops and that in Barind less suitable.

1-2 Farming Practices

(1) Rice

1) Variety and Cropp Season

Rice varieties suitable for various cropping seasons (aus, aman and boro) are different in eco-physiological characteristics as shown below.

Aus: Photo-insensitive and short-term varieties are grown. Growth duration is 95-110 days in LV and 110-130 days in MV. Recommended MV are BR1, BR9, BR14 and BR16. LV are mainly broadcasted (B.aus) on rainfed field and MV which covers only 3~5% of aus transplanted (T.aus) under irrigation. MV for B.aus (BR20, BR21) are recently released.

T.aman: Photo-sensitive and medium-term varieties are grown. Growth duration is 130-150 days in LV and 150-160 days in MV. Recommended MV are BR4, BR10 and BR11.

Deepwater rice(B.aman):

Very photo-sensitive and long-term varieties (LV only) are grown and growth duration is 220-260 days. Deepwater rice can elongate stem under deep water and most of varieties are tolerant upto 2m depth of flood water.

Boro: Photo-insensitive and short or medium-term varieties are grown. As temperature is low during early growing season, growth duration is prolonged as long as 150-180 days. Recommended MV are BR3, BR9, BR14 and BR15.

2) Cropping Calendar

Cropping calendar in each crop season of rice is influenced by flood season and cropping pattern as well as temperature and rainfall under rainfed condition. Sowing of B. aus and B. aman in the study area is delayed owing to drought with high temperature during late March and early April. Transplanting of T. aman is often prolonged because of delayed harvesting of B. aus or delayed preparation of seed-bed for uncertain rainfall. Transplanting time of T. aman and boro is restricted by low temperature at reproductive stage. Moreover, boro must be transplanted in January to February to avoid severe low temperature in December. The followings are present cropping calendar of rice with growth duration.

	<u>Seeding</u>	<u>Trans-Planting</u>	<u>Harvesting</u>	<u>Growth duration</u> Days
B. aus	Apr.-May	-	Jul.-Aug.	95-110 (LV)
T. aus	Mar.-Apr.	Apr.-May	Jul.-Aug.	110-130 (MV)
B. aman	Apr.-May	-	Nov.-Dec.	220-260 (LV)
T. aman	Jun.-Jul.	Jul.-Aug.	Nov.-Dec.	130-150 (LV) 150-160(MV)
Boro	Oct.-Nov.	Jan.-Feb.	May -Jun.	150-180 (MV)

3) Cultural Practices

B. aus: For direct-seeded aus (B. aus), field is ploughed and laddered by animal power after rainfall in April and seeds are broadcasted and covered by soils. Weeding and supplementary planting are necessary for higher yield. As harvesting is in the rainy season, cutting, threshing and drying works need much more times than other seasons.

T. aus: T. aus (MV) can be sown on seed-bed from mid-March and transplanted from mid-April after 30 days of nersery period.

- B.aman: Cultural practices for direct-seeded deepwater rice (B.aman) during early growth stage are same as B. aus. B.aman is recommended not to seed with B. aus because of less yield in mixed crop than separated one. B.aman is necessary to seed at least one month before entrance of flood water. Deepwater rice can be transplanted 3 weeks before flood starting with 30 days old seedlings.
- T.aman: Seedlings are transplanted on the ploughed and puddled field after 30~40 days of nursery period. Drought after the rainy season especially at flowering stage decides the yield of T.aman under rainfed condition.
- Boro: Boro rice increases recently along with the spread of low lift pump and tube well. Nursery period is needed for 45~50 days due to low temperature. Heavy fertilization is effective for high yield under rich solar radiation in the dry season.

Fertilizer dose, seed rate and pesticide application of farmers' base and recommended base are shown in TABLE V-3-1, V-3-2. Farmers usually apply less fertilizer dose and less frequency of pesticides than recommended except for boro for which farmers apply much more fertilizers. There may be no significant difference in seed rate of rice both on seed-bed and direct-seeded field between farmers' and recommended.

(2) Wheat

Rajshahi Region including the study area is one of the most important wheat producing area in the country. MV covers more than 80% of the wheat area in which short duration variety (Solanika) is more popular (about 80%) than medium duration variety (Kanchan, Balaka etc.) in this area. Growth duration of Solanika is 100 days and medium duration varieties 110 days which yield 10~20% higher than Solanika. When thermosensitive variety (Solanika) is planted earlier than mid-November, it comes to heading early and produce fewer tillers, small spikes and fewer grains per spike, but less thermosensitive (medium duration) variety performs well when grown in

early November. When planted in the middle or late of December, medium or long duration varieties give poor yield due to shrivelled grain as a result of the rise in temperature in March, but Solanika gives good yield when planted upto mid-December.

Seed rates vary with varieties, time or method of planting and moisture availability. Optimum seed rate is 115kg/ha under irrigated condition. Farmers are using lower seed rate (80kg/ha) without irrigation. Seed rate should be higher in late planting (10~20kg/ha more) and in case of variety with bigger grains like Solanika or less tillers (5kg/ha more).

(3) Sugarcane and Jute

Sugarcane and jute are mainly grown in high land or medium high land in flood plain and not in Barind Tract.

Sugarcane is usually planted in October to February and harvested in November to March. Growth duration is 12~15 months and ratooning is not common under rainfed condition. Vegetables and pulses are often intercropped in wide spaces between seed-cane planted rows during the early stage of growth. Much fertilizer application, two times of weeding and 3~5 times of pesticide application are necessary because of long growth duration. Distribution of disease-free seed canes (MV) and services of mechanical land preparation are conducted by the Sugar Mill for cane growers. Harvested canes are processed by the Sugar Mill or local private processors.

Two species of jute are grown namely, Corchorus capsularis (dessi jute) and C. olitorius (tossa jute). Tossa jute is predominant (covering 80%) in Paba flood plain and produces higher quality of fibre than dessi jute. Jute is seeded in March to April and harvested in July to August. Growth duration is 100~120 days. As jute is shortday plant, earlier sowing causes premature flowering and reduces yield and quality of fibre. The optimum time of harvesting for good quality and yield is when most of the plants start flowering. After harvesting, jute stems are assorted, bundled, defoliated and soaked in water for 8-10 days (retting). At the end of retting crude fibre of stems may be extracted by hand, washed in

the water, dried under sunlight and then sold in the market. Dried crude fibre is processed in the jute mill.

(4) Pulses and Oilseeds

Major pulses in the study area are Khesari (grass pea, Lathyrus sativus), black gram (Mashkalai), lentil and chick pea (Gram) which are grown in rabi season, so called as winter pulses. Cowpea (Barbati) and mungbean are not common but recommended as summer pulses. Khesari and black gram are popular legumes for food and fodder crops because of their tolerance to drought and other bad conditions. Lentil and chick pea are important leguminous food for protein source and widely grown in the country. These winter pulses are usually sown in the month of October to November and harvested as the seeds in February to March.

Rape and mustard are the most important oilseeds and others are some linseed and sesame in this area. Rape and mustard (or called only mustard) includes Brassica campestris (Tori and Yellow group) and B. juncea (Rai group). Tori group has blackish brown seeds with 2.5 gram weight per 1,000 seeds and growth duration is completed in 75~85 days. Yellow group has yellowish seeds with 3.2 gram weight per 1,000 seeds and matures in 95~105 days. Rai group has deep brown seeds with 2.47 gram weight per 1,000 seeds and matures in 95~100 days. The mustard is usually sown in October to December and harvested in January to March. The seeds contain 40-44% oil but yield 36~39 oil when pressed in expeller.

(5) Potato and Vegetables

Potatoes of both LV and MV are usually grown in the study area. Coverage of MV is different by area viz. higher percentage in Paba flood plain (52%) than in Barind area (25%). Virus free seed potatoes of MV are multiplied in the BARI farms from original varieties imported from Holland and distributed by BADC. Generally, LV produces potatoes of higher quality but less yield than MV. Potato is the winter crop which is planted in November and harvested in February to March.

There are many kinds of vegetables in the study area. Major winter vegetable crops are brinjal, radish, cabbage, cauliflower, tomato, beans and spinach. Summer vegetables are patal (small size cucurbit), cucumber, pumpkin, melon and brinjal. The kinds and production are much more in winter vegetable than in summer vegetables. Winter vegetables are usually planted in September to November and harvested in November to March, while summer vegetables are planted in February to April and harvested in June to August.

(6) Other crops

Other crops includes fruit trees, condiment and spices, and drugs and narcotics.

Major fruits are mango, banana, jackfruits, litchi, papaya and pineapple. Most of these fruit trees are grown near or inside of residential area.

Main condiment and spice crops are onion, turmeric, chilly, garlic and corriander. Onion is widely grown like as vegetables in the study area.

Drug and narcotic crops are betel leaves, betel nut and tabacco. Betel leaves are usually grown near the river side under shade.

1-3 Cropping Pattern

Depending on land use survey, major Cropping Patterns in the study area are divided into that in Barind area and in Paba flood plain with percent area and soil series.

In Barind area, most of cropped area is occupied by rice in which T. aman is the main crop. Therefore, cropping patterns in Barind area are simple and may be mainly monocropping of T. aman with some T. aman combined with boro, aus and upland crop (UC) as shown as follows:

	Percent area	Soil mapping unit
Fallow - T.aman - Fallow	62	1, 2, 3, 4, 5, 6, 14
Fallow - T.aman - Boro	14	1, 2, 3, 6, 10
Aus - T.aman - Fallow	15	1, 2, 7, 10
B. aman - Fallow / UC	1	9, 11
Aus - Fallow -UC	5	2
Fallow - Boro	3	11, 15, 16

(UC includes wheat, pulses, oilseeds, potatoes and vegetables)

In Paba flood plain, on the other hand, rice and upland crops occupy nearly equal area and T. aman is not main crop, moreover, many kinds of up land crops are grown. Major cropping patterns in Paba flood plain are as follows:

	Percent area	Soil mapping unit
Sugarcane (year-round)	24	7, 8, 12
Fallow - T.aman - UC	2	13
Aus - T.aman - Fallow	13	7, 10
Aus/Jute - Fallow - UC	23	7, 8, 12
Aus - T.aman - UC	4	7
Fallow - T.aman - Fallow	5	8, 12, 13
Fallow - T.aman - boro	2	10
Fallow - boro	13	11
B.aman - UC/Fallow	10	10, 11
Winter & summer Vegetable	4	8, 12

1-4 Livestock and Poultry

As indicated in TABLE V-1-5, total number of bovine is approximately 326,000, sheep and goat 130,000 and poultry 556,000 in the three upazila in Rajshahi district related to the study area (1986-87). These indicate 2.6 time increase in bovine, 2% decrease in sheep and goat, and 25% increase in poultry in comparison with 1983-84. Eighty percent of bovine is cattle and 20% buffaloes. Bovine is mainly used for land preparation of farm and transportation. Sheep and goat are both small size species

and goat is much more raised than sheep. Within poultry, 70% are chicken and 30% duck.

Livestock Development Program is carried out by DLS (Directorate of Livestock Services). The program activities are artificial insemination, fodder production, prevention of diseases, fattening and goat distribution.

The Artificial Insemination Centre located in Rajshahi town serves for the development of cattle head in Rajshahi Region. The Centre has Seven Stud Bulls (improved foreign breeds) for the collection of semen. Semen is supplied for insemination to 50 sub-centres and points three days in a week.

Feed for draft animals is straw, bran and oilcake. No fodder crop is grown in farm. Improvement of nutrition and health of draft animals is important for effective working capacity.

Livestock health and Nutrition Program is one of the component of NWRDP. The objective of the program is to improve the health, nutrition and hence working capacity of cattle used for draft. The program activities are strengthening of existing Upazila Veterinary Dispensaries (UVD) and livestock extension services. UVT will be provided with additional equipment, pharmaceuticals and vaccines.

The existing staff members of Upazila Livestock Assistant (ULA) and Livestock Field Assistant (LFA) will be increased in number and provided with equipment to improve field-level services to farmers.

For improvement of livestock nutrition technique, the strengthened staff (ULA, LFA) demonstrate urea/straw treatment and promote planting of the leguminous fodder shrub. Distribution and rearing of goat and poultry has been progressed in the five Upazilas.

Rajshahi Dairy and Cattle Improvement Farm located in upazila Godagari is one of the three national dairy farms and conducts improvement of local breed of milking cow. The Farm rears more than 300 heads of cattles including heifer and calves, and also produces fodder seeds and cutting for distribution and green fodder for the cattle in the Farm. Major fodder crops grown are sorghum, maize, Napier grass, cowpea, sunflower etc.

Rajshahi Poultry Improvement Farm next to the Dairy Farm is rearing 16,000 of various kinds of chicken for breeding, multiplication and distribution.

1-5 Inland Fishery

Depending on the 1983-84 survey, catch from inland waterbody in Rajshahi Region is approximately 31,000 ton (TABLE V-1-6). Out of these catch, 34% is from rivers, 29% from beels, 26% from ponds and remaining 11% from flood area. The area of cultured ponds is 30% of total pond area (14,700 ha), but fish production is 65% of catch from the total ponds. Average fish yield in cultured ponds is 1.17 ton/ha per year which is lower than that in the tropical area (2~5 ton/ha) due to water shortage in dry season. Fish species from rivers are carp (more than 80% of catch), catfish and live fish. Cultured fishes are carp classified as rui, catla, mrigal, grass carp, silver carp and common carp.

There are so many ponds and tanks in the related Upazila of the study area (TABLE V-1-7). Out of total area of the ponds (4246 ha), 48% is currently used for fish culture, 33% culturable (but not used now) and remaining 19% derelict. Within cultured ponds area (48%), Government-owned is 10% and private-owned 29%. Culturable and derelict ponds are all owned by private individuals.

The Directorate of Fisheries (DOF) administers ponds over 0.8 ha while smaller ponds are re-leased by the local administration or the Department of Revenue. The ponds are leased to cooperatives or private parties under specific conditions. The terms of lease is usually one to three years.

DOF administers inland fisheries. It controls government-owned ponds and natural or cultured fishery and supplies fingerling through FSMF (Fish Seed Multiplication Farm). There are eight FSMF in Rajshahi Region which produce fingerling and distribute to growers.

North West Rural Development Project (NWRDP) has the Aquaculture Development Program in its various components. The objective of the program is to improve Government-owned derelict pond for landless people to enterprise fish culture. The ponds are leased to landless cooperatives (BSS) or women's cooperatives (WBBS) for a period of eight year. One BSS will operate in one village where 0.4 ha (one acre) of pond will be available to a village group. Fish-polyculture (mixed culture of various species) will be adopted to increase the productivity per unit water area. To further income, aquaculture is combined with duck and banana raising on the pond dikes.

The two Fish Seed Multiplication Farms (FSMF) are selected to be upgraded out of the existing FSMF in Rajshahi Region. The selected FSMF will be provided with reliable water sources and distribution system, new ponds and a hatchery equipped to increase the production of hatchling and fingerling of various cultivable species, and with a water testing kit and other necessary equipment.

Out of the FSMF in Rajshahi Region, followings are located around the study area:-

Rajshahi District : Paba (3.6 ha), Puthia (1.6 ha)

Nawabganj District: Nachol (1.6 ha)

Natore District : Natore (3.6 ha)

Naogaon District : Naogaon

Figures in parenthesis show area of ponds and hatchery at each FSMF. Production of fingerlings per year is 400,000 at Paba, 150,000 at Puthia and 500,000 at Natore. Price of fingerling is different depending on the size, TK. 200-500 per thousand fingerlings (approximately, TK. 200 for 3.5 cm, TK. 500 for 7 cm of fingerling). Production of fingerlings is sufficient to meet the demand in the study area.

2 Agricultural Supporting Services

2-1 Research Work

The Bangladesh Agricultural Research Council (BARC) has the responsibility to strengthen the agricultural research capability of the following institutes through planning and integration of resources and coordination of research effort.

The Bangladesh Agricultural Research Institute (BARI) is the largest and most diversified of the research agencies. Extent of research works are field crops (except rice, jute and sugarcane) and horticultural crops, including research fields of breeding, agronomic practices, soil management, agro-economy and post-harvest technology. It has 4 regional stations, 11 Substations and 6 Special Crop Research Stations.

The Bangladesh Rice Research Institute (BRRI) has also many kinds of research field necessary for rice production. It has seven regional stations, one of which is Rajshahi station. Main item of the station is breeding of cold tolerant and drought tolerant varieties.

The Bangladesh Jute Research Institute (BJRI) researches on jute and kenaf production and fibre processing.

The Sugarcane Research and Training Institute (SRTI) conducts research of sugarcane production and processing and production of cane-seed.

The Bangladesh Tea Research Institute (BTRI) conducts research for improvement of tea variety and management practices.

The Institute of Nuclear Agriculture (INA) is a service unit applying nuclear technology for mutation breeding of crops, storage and plant nutrition research.

The Bangladesh Institute of Development Studies (BIDS) studies on socio-economic problem of agriculture and other sectors.

National Livestock Research Institute (NLRI) researches on physiology, veterinary and production of livestock.

Fisheries Research Institute

Forest Research Institute

2-2 Extension Services

Department of Agriculture Extension (DAE) plays the main role for the transfer of technology. Under DAE, Regional Director supervises and liaises with Deputy Director at District office in which staffs are 2-4 subject matter specialist and one training officer (FIGURE V-1-1).

At Upazila level, one each of Upazila Agricultural Officer (UAO), Subject Matter Officer (SMO), Assistant or Junior Agricultural Extension Officers are working staff.

There is a Block Supervisor (BS) at Union level, who receives training from SMO on new technologies at the Upazila and visits to Contact Farmers (CF) to disseminate the information. CF spread the same information to general farmers (Non-CF). This system is called as Training and Visit (T&V) system in which one BS covers 80 CF and one CF 10 Non-CF.

DAE has three programs of ISCP, IACP and IRCP for increasing production of summer, autumn and rabi crops, respectively corresponding to North West Rural Development Project. DAE has twelve Agricultural Training Institute (ATI), the Central Extension Resources Development Institute (CERDI) and Agricultural Information Services (AIS).

In livestock sector under DOLS, District Livestock Officer and Additional District Livestock Officer supervise the extension activities of Upazila Livestock Officer, Veterinary Assistant Surgeon, Upazila Livestock Assistant and Livestock Field Assistant.

In inland fishery under DOF, District Fishery Officer and Head Assistant at district level supervise and coordinate FSMF and Upazila Office in which Upazila Fishery Officer, Assistant Upazila Fishery Officer and Field Assistant are working.

2-3 Agricultural Input

Main input materials for crop production are distributed by Bangladesh Agricultural Development Corporation (BADC) which has department of seed production and distribution, fertilizer and irrigation equipment.

Rice seed (MV) is produced at seed farm under BADC based on the foundation seed from BRRI and distributed to farmers through district and

Upazila office of BADC. Seed of other crops is produced at BADC regional farm or registered seed growers and/or imported directly by BADC, then distributed through the same route as rice seed. In case of sugarcane however, improved and disease-free cane seed is produced at SRTI farm and distributed through sugar mills to growers.

BADC is the monopoly agent of chemical fertilizer viz. urea, triple super phosphate (TSP), murate of potash (MP) and some others. Fertilizer is distributed to local dealers through district and upazila office of BADC.

The dealers including wholesaler and retailer are trained at BADC and play a role to disseminate fertilizer knowledge to the farmers and to make fertilizer available to the farmers timely and in adequate quantity. However, assisting and advising fertilizer use is the responsibility of extension office. As for pesticides, private companies import and sell them through their dealers located in the upazila and other markets.

BADC constructs and places into operation deep and shallow tube well (DTW, STW) for farmers' cooperative and also distribute low lift pump (LLP). Maintenance of constructed tube wells are the responsibility of users who are trained at BADC. Water management technique at field level is advised by agriculture extension staff. Barind Integrated Area Development Project administered by BADC conducts DTW construction and its effective use for crop production.

2-4 Post-harvest Processing

(1) Processing of Rice, Wheat and Oilseed

These cereal grains and oilseed are usually processed at small private mills. The Small and Cottage Industry Corporation supports these mills. Rice and wheat are usually processed at same mill both in Urban and country area. One mill has one rice hasking to cleaning machine and one wheat grinding machine with one electric or engine power for both machines. Capacity of rice processing at these mills is approximately 1-2 tons per day.

The mills in the country area are usually equipped with boiling or steaming equipment and also with open spaces (yard) for drying paddy. These are used for perboiled rice processing. Perboiled rice has

advantages of restricted deterioration of grains and protection from grain insect pest. Total number and husking capacity of rice mills in the study area and Rajshahi town are 125 and 45,000 ton per year (1985), respectively.

Oilseed mill usually extracts mustard oil by expeller extractor. Capacity of the mill equipped with four expeller is 50 kg of oilseed per hour. For the lack of domestic raw materials, imported oilseed from Canada is often extracted. There are 16 oil mills in Rajshahi town and Paba, which have totally 1,400 ton of production capacity.

(2) Sugarcane Mill

Rajshahi Sugar Mill Ltd., is a Government-owned mill under the supervision, control and co-ordination of Bangladesh Sugar and Food Industries Corporation. Grinding capacity of the mill is 1,524 MT of sugarcane per day. Operating months are usually from mid-November to mid-May. Crashed cane in 1986-87 (upto April '87) was 226,871 MT. The mill produces 15,000 MT of sugar per year. Recovery percentage of sugar is about 8.5%.

Harvested canes supplied to the mill are purchased and transported by the mill through various cane centres (road head, railway head and sub-centre on road head) except for canes directly received at the mill gate.

The mill has farm machinery for land preparation of cane field. They are tractors (18), ploughs (18), harrows (9) and ridgers (9) which are leased to cane growers. Breaking the hardpan in subsoil by deep ploughing is effective for the roots to penetrate soil and to absorb moisture and nutrition. Harrowing is also beneficial for emergence and establishment of young seedling. The mill also equips machinery for transportation of canes from the cane centres to the mill. These are tractors, trailers and trucks.

(3) Jute Mill

Jute is usually planted mid-March to April and harvested July to August. After harvesting, jute stems are soaked in water for retting. After retting, crude fibre of stem is extracted, washed, dried and sold in the market. Dried crude fibre is processed in the jute mill.

There are 36 Government jute mills in Bangladesh which are controlled by Bangladesh Jute Mills Corporation (BJMC). Besides these, 33 jute mills were disinvested by BJMC (Ref. Jute Goods Statistics, 1983-84) and being operated under private management.

Rajshahi Jute Mill is one of these mills under BJMC. Its looms installed are 134 for hessian and 105 for sacking. Machinery for processing crude fibre to weaving are also installed. Processes to hessian are softing and piling to make crude fibre softer, breaking and drawing to make more fine fibre and then spinning, winding and weaving. Weaving production of Rajshahi Jute Mill is 2,827 ton for hessian and 2,168 ton for sacking (total 4,995 ton) in 1983-84. The mill produces totally 19-20 ton per day and runs 24 hours in 3 shift and 300 days per year.

3 Agricultural Development Plan

3-1 Proposed Farming Practices

3-1-1 Cropping Calendar

There are three crop seasons namely, Rabi/Boro (Oct-March), Kharief-I/Aus (April-June), Kharief-II/T.aman(July-Sept). The practical planting and harvesting dates in the project area are not always similar to other parts of Bangladesh due to different agro-climatic condition, especially severe drought and low temperature in winter or summer season. The followings are the present constraints and improved practices of cropping calendar in different crop seasons as experienced from research findings of Rajshahi Regional Station of BRRI.

(1) Rabi/Boro season

Boro (MV) is grown in medium lowland to high land always under irrigated condition and boro (LV) in very lowlying depressed area without or with supplementary surface irrigation.

Coverage under boro (LV) is very limited. Most of the seed-beds for boro are prepared in the month of October with natural existing available water after the rainy season. Irrigation water is usually not used for seed-bed. Transplanting of boro (MV) crop however, starts from mid-January with 60 days or more aged seedlings. The prolonged nursery period is attributed to avoid severe low temperature which often incur cold damage of transplanted seedlings during the month of December. Use of over aged seedlings results in low yield of grain.

Under improved cultural practices, seed-bed of boro (MV) should be started from mid-November with irrigation facilities and transplanting be started from 1st January with 45-50 days old seedlings. Boro crop transplanted upto mid-February may easily be harvested within the month of May.

Many Rabi crops (winter crops) are grown in the same season, viz. wheat, barley, oilseeds (mustard, linseed), potatoes, winter pulses (lentil, black gram, etc.) and winter vegetables (cabbage,

cauliflower, radish, tomato, brinjal, bean, etc.). Sowing of Rabi crops starts from mid-October and ends at mid-December, and most of Rabi crops are harvested by the end of March.

(2) Kharief-I/Aus Season

Direct seeded aus or B.aus (LV) is mainly grown under rainfed condition and newly released direct seeded aus (MV: BR20, BR21) in very limited area. B.aus is seeded from mid-April to mid-May in the project area, unlike as other parts of Bangladesh where B.aus is seeded in March to April. Aus crop sown from the end of March to mid-April in the project area is seriously suffered from long drought period along with extremely high temperature (Hot-spell); and produces very poor yield. Thus, B.aus is harvested often after mid-August and transplanting time of T.aman becomes late.

Under irrigated condition with improved cultural practices, transplant aus (T.aus, MV) planted in the month of April with 30 days old seedlings may easily be harvested by the end of July, and T.aman (MV) be grown.

Deepwater rice is usually direct-seeded (B.aman) in those land where flood water enters during the period from mid-May to June and stands 1-2m in depth in the month of July-August. In the project area, B.aman is sown in April-May due to hot-spell and harvested in November-December. B.aman is distributed in flood plain and not in Barind Tract. Growing area of B.aman can easily be shifted into boro (MV) area like as other parts of Bangladesh and at the same time B.aman may be followed by boro in the same land. B.aman should be direct-seeded more than one month before entrance of flood water, as young seedling has no flood tolerance. Therefore B.aman is not practiced after harvesting of boro crop in flood-plain area. However, deepwater rice can be transplanted after boro harvest with 30-40 days old seedlings. Elongation ability and flood tolerance of deepwater rice are not affected by transplanting of the seedlings when transplanting is completed at least 3 weeks before the field is submerged. In addition, if the soils remain soft under standing water, the seedlings are easily transplanted between hills of the harvested boro crop without any soil preparation.

Jute is usually grown in summer season (Kharief-I). Two kinds of jute namely Corchorus capsularis (dessi jute) and C. olitorius (tossa jute) are grown in Paba flood plain. Capsularis is grown in lowland and medium highland. Capsularis in lowland is sown at 1st week of March and harvested by June owing to entrance of flood water. Capsularis in medium high land is sown in March to April and harvested 1st week of July. Olitorius is always grown in high land and sown in April and harvested by July. T.aman can be grown after harvest of both kinds of jute. In Paba flood plain, olitorius is dominant with coverage of 80%. Under rainfed condition, sowing of jute in medium highland to highland is delayed due to water shortage. Sowing of jute is completely dependent on uncertain rainfall. Transplanting of T.aman becomes late because of late harvest of jute crop. Planting of jute and T.aman will be possible in right time under irrigated condition.

Under irrigated condition, green manure crops such as Sesbania or Dhanicha can be recommended to increase organic matter content of the soils. Green manure may easily be grown during 60 days between harvesting of boro and transplanting of T.aman. Summer pulses (mung bean), oilseeds (sesame) and some vegetables (brinjal, pumpkin, melon, patal etc.) are grown in the summer season.

(3) Kharif-II/T.aman Season

Under rainfed condition, seed-bed for T.aman (MV) is started from mid-June and transplanting from mid-July. Transplanting continues normally upto the end of August but sometimes goes upto 1st week of September in abnormal years. Yield of rainfed T.aman is completely dependent on intensity and distribution of rainfall. The time of seed-bed preparation and transplanting is not ensured due to uncertain rainfall and maintenance of appropriate soil moisture in different growth stages of the rice plant especially at reproductive stage is not possible. Late planting results in lower grain yield due to low temperature during delayed reproductive stage. As minimum temperature is going down below 20°C during reproductive stage, grain yield of T.aman (MV) decrease gradually. Cold injury of T.aman (MV) may be more severe below 15°C of minimum temperature for 5-6 days which had occurred sometimes in mid or late November and frequently in

December. However, cold tolerant LV or local improved varieties (L1V) can be safely matured under these low temperature.

Under irrigated condition, T.aman (MV) should be transplanted up to 10th August with 30 days aged seedlings. After then, L1V such as Naizersail, BR5 or cold tolerant LV may be transplanted upto the end of August. T.aman(MV) may be harvested upto the end of November and L1V upto 20th December. Promising advanced lines tolerant to coldness have been bred at Rajshahi Station of BRRI, and may be released as new MV within 2 or 3 years.

The followings are the improved cropping calendars of major crops under irrigated condition in the Project area.

Cropping calendar

	Seed-bed	Sowing/ Planting	Harvesting
T. Aus(MV)	Mar. 15-Apr 10	Apr. 15-May 10	Jul. 15-Aug. 10
T. DWR	Apr. 15-Apr. 30	May 15-May 30	Dec. 1-Dec. 10
T. Aman(MV)	Jun. 15-Jul. 10	Jul. 15-Aug. 10	Nov. 15-Nov. 30
T. Aman(L1V)	Jul. 15-Jul. 30	Aug. 15-Aug. 31	Dec. 1-Dec. 20
Boro	Nov. 15-Dec. 31	Jan. 1-Feb. 15	May 1-May 20
Wheat	-	Nov. 10-Nov. 30	May 10-May 30
Winter crops	-	Nov. 20-Dec. 20	Feb. 20-Mar. 30
Summer crops	-	Mar. 20-Apr. 10	Jun. 20-Jul. 10
Winter vegetables	-	Oct. 1-Nov. 30	Mar. 1-Apr. 30
Summer vegetables	-	Apr. 1-May 30	Sep. 1-Oct. 30
Sugarcane	-	Jan. 1-Feb. 28	Nov. 20-Apr. 20
Jute	-	Mar. 15-Mar. 30	Jul. 10-Jul. 30

3-1-2 Management Practices

Modern varieties(MV) have high potential yield, but generally need much more application of inputs and favorable conditions for higher yield. MV also have comparatively lower tolerancy to unfavorable circumstances such as drought and low temperature than local varieties (LV). MV of rice and some other crops are inferior in quality or price to some LV of these crops.

Under rainfed condition, field operation such as land preparation and planting as well as growth and yield are depend on uncertain rainfall. Then, farmers prefer to grow LV, to apply less quantity of fertilizer and pesticides than recommended dose and to practise less intensive management owing to fear of drought damage.

Under ensured irrigated condition with project implementation however, application of inputs will be increased and more intensive management be practised along with the introduction of MV according to the recommended technology. Actually, farmers apply higher dose of fertilizer than the recommended one in irrigated boro rice. TABLE v-3-1, v-3-2 shows fertilizer dose, seed rate and pesticide application without and with project implementation. Those without project indicates present farmers' dose under rainfed condition and those with project recommended dose under irrigated condition.

3-2 Proposed Cropping Pattern

Triple cropping of rice (aus-aman-boro) under irrigation is possible but not practical in the project area for several reasons. At first, the total yield of triple cropping is often similar to or lower than that of double cropping due to use of lower yielded early variety for boro and delayed transplanting of T.aman in triple cropping. Secondly, continuous wetness of soils under triple cropping will promote leaching of nutrient in soils especially defficiency of sulfur and zink. Thirdly, year round rice growing causes increased incidence of disease and insect pest because of the year round availability of host plant which provides favarable conditions for population build-up of pathogens and insects. It is recommended that land should be dried and planted a crop other than rice in the dry season.

In this plan, double cropping of rice is proposed viz., T. aus-T. aman and T. aman-Boro. Boro-aus is usually not practical for overlapped growing duration of both crops.

In Barind area, most of soils are not so suitable for dryland crops but suitable for paddy which covers 90% of total cropped area indicating almost rice-based cropping pattern. Thus, proposed cropping pattern in Barind area should be mainly T. Aus-t. aman and T. aman-Boro along with some winter or summer crops as shown in FIGURE V-3-1 and below.

Growing season of boro and aus are overlapped during April to May. Boro should be grown in larger area than aus within the range of available water of irrigation during overlapped duration because of higher yield in boro. As wheat is the important crop in Barind area, wheat area should be increased. To improve soil fertility, green manure is recommended to be planted between boro and T. aman crops and much summer pulses after wheat. Late planting of T. aus should be followed by cold tolerant T. aman (L1V).

<u>Cropping pattern</u>	<u>Coverage</u>	<u>Soil mapping unit</u>	<u>Land type</u>
T. Aus - T. Aman - Fallow	27% 11,390ha	1,2,3,4,5	Highland
T. Aus - T. Aman - WC	3% 1,270ha	2,6	Highland
SC - T. Aman - Wheat	60% 4,220ha	1,6	Highland
GM - T. Aman - Boro	50% 21,100ha	1,2,3,5,14	Highland
Fallow - T. Aman - Boro	10% 4,220ha	6,10,11	Medium Highland

WC = winter crops : pulses, oilseeds, potatoes, vegetables

GM = green manure : Sesbana

SC = summer crops : pulses, oilseed, vegetables

In Paba flood plain, there are several soil series along with the difference in land level, but most of soils are suitable for both paddy and dryland crops. After project implementation with irrigation and drainage, flood area will still remain in lowland where transplant deepwater rice (T. DWR) should be grown upto 2m depth of flood water after harvest of boro. Sugarcane is beneficial and should be grown in higher land with one ratoon crop and T. aus - T. aman in 3-year rotation as below.

<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	
① Sugarcane (replant)	Sugarcane(ratoon)	T.Aus-T.Aman	(12%)
② Sugarcane (ratoon)	T.Aus - T.Aman	Sugarcane (replant)	(12%)
③ T.Aus - T.aman	Sugarcane(replant)	Sugarcane (ratoon)	(12%)

Vegatables are also beneficial in this area, because soils especially in high land are suitable for vegetable production and the location is near to large consumers in Rajshahi town. Rotation of vegetable crops is recommended for the maintenance of higher productivity.

Other land in this area should be covered with T.aman-based cropping pattern combined with winter crop-jute or wheat-summer crop. Proposed cropping pattern in Paba flood plain is shown in FIGURE V-3-1 and as follows;

<u>Cropping pattern</u>	<u>Coverage</u>	<u>Soil mapping unit</u>	<u>Land type</u>
Fruit (Perenial)	4% 360ha	7, 12	Highland
Sugarcane (year round)	24% 2,160ha	7, 12	Highland
T.Aus - T.Aman - (Sugarcane)	12% 1,080ha	7, 12	Highland
Jute - T.Aman - WC	12% 1,080ha	7, 12	Highland
Summer Veg. - Winter Veg.	4% 360ha	7, 9, 12	Highland
SC - T.Aman - Wheat	12% 1,080ha	10, 13	Mediun highland
Fallow - T.Aman - Boro	24% 2,160ha	10, 11, 13	Mediun highland
T.DWR - Boro	8% 720ha	11	Mediun lowland

WC = winter crops : pulses, oilseeds, potatoes,

SC = summer crops : pulses, oilseed,

T.DWR = transplant deepwater rice

Summer vegetables : brinjal, patal, cucumber, bean, pumpkin

Winter vegetables : radish, cabbage, canliflower, brinjal, potatoes, spinach

3-3 Target Yield and Production

3-3-1 Target Yield

Without project implementation, most of crops under rainfed condition will gain some increase in yield because of gradual increase in coverage of MV and/or limited dissemination of improved cultural practices.

Under irrigated condition with project, remarkable increase in yield will be expected in most of crops. Depending on present condition of crop production, recommended cultural practices, situation of agricultural extension services and data of irrigation effect and potential yield of crops from research stations, target yields of crops are anticipated as follows and indicated in Table V-3-3, V-3-4 And V-3-5.

(1) Yield of rice

Average yield of T.aman (MV) in field tests for 3 years by BRRRI, Rajshahi Station was 6.4t/ha. Average yield of T.aman (BR4, BR10, BR11) in climatic effect test at Rajshahi Station transplanted from June 30 to Aug. 10 was 6.0t/ha and that of T.aman (L1V) transplanted from Aug. 15 to 30 was 4.2t/ha. Weighed average of yield during T.aman season was 5.4t/ha. As T.aman will widely be grown on various soils and by farmers of various technical levels in the project area, farmer's yield will be varied from 3.0 to 6.0t/ha including LIV and MV. Thus, target yield of T.aman may be anticipated as 4.0t/ha.

Boro (MV) has high potential yield under irrigation because of higher solar radiation and less disease or insect pest during growing season especially at reproductive stage. Depending on the climatic effect test, average yield of boro rice (BR3, BR14) transplanted from Dec. 30 to Feb. 15 was 6.0t/ha. The higher level of farmers' yields under irrigation are 5~6t/ha. As boro rice will be grown within some limited area in more suitable conditions for higher yield, average yield in the project area may be anticipated as 5.0t/ha ranging from 4.0~6.0t/ha.

Yield of aus is generally lower than boro and T.aman for the reason that the reproductive stage is under lower solar radiation in the rainy season and early matured varieties are used for earlier harvesting. The climatic effect data shows that average yield of

T. aus (BRI, BR3, BR9) transplanted from Mar. 30 to May 30 was 4.6t/ha. Although present yield of T. aus (MV) is low under the small coverage, yield will increase to the range of 3t to 4t/ha through dissemination of improved cultural practices and improved varieties. Thus, target yield of T. aus may be anticipated as 3.5t/ha.

Yield of transplant deepwater rice (T. DWR) is higher than direct-seeded one (B. aman). T. DWR (LIV) can produce grain yield of 1.5t/ha or more under improved cultural practices.

(2) Non-Rice Crop

Most of non-rice crops have more or less adaptability to rainfed condition. Rabi crops such as winter pulses, oilseeds and potatoes are planted in October to November and can grow and mature within 3 month after sowing under non-irrigated and little rainfall condition, utilizing residual soil moisture after rainy season. But yield is generally at low level. Without project implementation, yield of these crops will hardly increase under rainfed condition. Under irrigated condition with project, most of these crops will be significantly increase in yield through introduction of MV and improved cultural practices.

Wheat is known as drought tolerant crop. However, research at BARI found that the wheat yield with irrigation was 4t/ha compared with 2.8t/ha without irrigation. This indicates the effect of irrigation to increase 50% in grain yield. Target yield of wheat is anticipated as 3.5t/ha under irrigated condition with better fertilizer application and management, as yield without project will be 2.3t under full coverage of MV.

At present, average yield of sugarcane in the project area is 46t/ha which is higher than national average (42t/ha). As soil condition of sugarcane area in Paba flood plain is suitable for growth and supporting services of government are available, yield of cane without project will increase to 50t/ha even under rainfed condition.

SRTI indicated that irrigation can produce significantly higher yield of sugarcane along with two other benefits of ratooning and increasing yield of late-planted cane which reduces processing cost by lengthening the crushing season. Therefore, average yield of

replanting cane is anticipated as 70t/ha and of ratooning cane as 63t/ha estimated at 10% less than replant yield. This replant yield is less than yields in tropical country (80~95t/ha) and even in the subtropical zone of Japan (75t/ha).

The climate in winter season is suitable for potato growing. Present yields of potatoes are 6.5~7.2t/ha for LV and 6.7~7.4t for MV. Research yields of MV are 20~30t/ha under irrigation and that of LV 12~15t/ha. LV produces potatoes of higher quality and price but less yield than MV. Percent coverage of MV is 25% in Barind and 52% in Paba flood plain. With project under irrigation, yields of potatoes will be estimated at 15t/ha for MV and 9t/ha LV. Assuming that MV and LV may have equal coverage in the project area, average yield is anticipated as 12t/ha.

Present average yields of pulses and oilseeds are very low (0.6~0.7t/ha) under rainfed condition. Irrigation along with introduction of MV and improved cultural practices will also produce much more average yields anticipated as 1.2t/ha for pulses and 1.0t/ha for oilseeds.

3-3-2 Target Production

Target Productions of each crops are anticipated as shown in TABLE V-3-3, V-3-4, depending on target yields and cropped areas which are culcultated from the percent coverage of proposed cropping pattern. Total production of rice in the proposed irrigable area will increase to 370,000t which is approximately 4.8 times of present production in the project area. Total productions of wheat and sugarcane will be 2.0 and 1.4 times of present productions, respectively.

Paba flood plain in the Project area includes west-half of Paba Upazila and small parts of Godagari and Tanore Upazila. Therefore, present crop area and cropping intensity in the flood plain area are different from that in whole Paba Upazila in Table 3-4-1.

3-4 Post-Harvest Facilities

Total paddy production in the study area (in the related five upazila) was estimated at 193,000ton in 1985-86. There are 125 rice mills

in five upazila and Rajshahi town with husking capacity of 45,000ton (actual paddy husked was 83%) in 1985. Paddy which has not been processed at the rice mills may be husked by rice husking petals at farm household. After project implementation, increased production of paddy in the project area will be 293,000ton. Thus, establishment of new rice mills is recommended for processing the increased production of paddy.

Estimated production of wheat in the study area is 19,550ton in 1985-86. Crushing capacity of flour mills in Paba and Rajshahi town is 5,600ton and in Nawabganj 2,750ton. Wheat other than crushed at flour mills may be processed in farm household or shipped to other parts of the country. Increased production of wheat with project is 8,250ton. To consume this increased production in the study area, new flour mills should also be established.

Production of oilseeds in the study area is approximately 900ton, but extracting capacity of oil mills in Rajshahi town is 4,050ton and in Nawabganj 9,600 (actual oilseed extracted in Rajshahi town was 2,500ton and in Nawabganj 960ton in 1985). The oil mills in Rajshahi town are processing much more imported oilseed than local one. Increased production of oilseed with project will be 9,300ton. Therefore, existing oilseed processing facilities may be sufficient after project implementation, if the oil mills will process the increased local oilseed in place of imported oilseeds.

Rajshahi Sugar Mill has grinding capacity of 1,530ton of cane per day. Crushed cane in 1986-87 was 226,900ton during 157 days from Nov. 14 to Apr. 19. Maximum crushed cane of 266,000ton was obtained during 172 days from Oct. 30 to Apr. 19 in 1981-82. Increased production of sugarcane with project will be approximately 75,000ton. If sugarcane production after project implementation in the command area of the mill except the project area will be less than at present, present capacity of the mill would be sufficient to process the increased production through prolonged operation date of the mill and harvest duration upto mid-May. If the production will increase new processing facility should be increased for additional production of cane.

TABLE V-1-1 CROP AREA IN HECTARE BY UPAZILA, 1985-86

	Niamatpur	Tanore	Godagari	Nachole	Sub-total of Barind	Paba	Total
Rice (Total)	43,230	29,049	37,939	27,542	137,760	15,534	153,294
Aus	7,006	4,414	6,806	3,503	21,729	6,686	28,415
T. Aman	34,919	20,594	30,010	23,571	109,092	4,657	113,751
B. Aman	51	810	500	263	1,624	3,645	5,296
Boro	1,254	3,231	623	205	5,313	546	5,859
Wheat	1,235	2,074	3,019	468	6,796	2,981	9,777
Jute	26	121	206	16	367	3,252	3,621
Sugarcane	-	-	125	1	126	3,807	3,933
Pulses	12	20	340	42	414	975	1,389
Oilseed	174	181	453	150	958	524	1,482
Potatoes	322	168	111	15	616	585	1,201
Vegetables	502	280	305	58	1,145	1,159	2,304
Condiments	79	29	119	7	234	195	429
Fruits	188	86	125	24	423	686	1,109
Others	481	1,281	165	1,281	3,208	1,556	4,764
Non-rice (Total)	3,019	4,213	4,968	2,062	14,260	15,720	29,982
Total Cropped Area(TCA)	46,249	33,289	42,907	29,604	152,022	31,254	183,303
Net Cropped Area	35,638	22,818	33,562	23,132	115,150	17,506	132,656
Cropping Intensity	130	146	128	128	133	178	138

Source: Regional Statistical Office, Rajshahi

TABLE V-1-2 PERCENT AREA OF CROPS TO THE TOTAL CROPPED AREA, 1985-86

	Niamatpur	Tanore	Godagari	Nachole	Sub-total of Barind	Paba	Total
Rice (Total)	93.5	87.3	88.4	93.0	90.6	49.7	83.6
Aus	15.2	13.3	15.9	11.8	14.3	21.4	15.5
T. Aman	75.5	61.9	69.9	79.6	71.8	14.9	62.0
B. Aman	0.1	2.4	1.2	0.9	1.0	11.7	2.9
Boro	2.7	9.7	1.4	0.7	3.5	1.7	3.2
Non-Rice (Total)	6.5	12.7	11.6	7.0	9.4	50.3	16.4
Wheat	2.7	6.2	7.0	1.6	4.5	9.5	5.3
Jute	-	0.4	0.5	-	0.2	10.4	2.0
Sugarcane	-	-	0.3	-	0.1	12.2	2.1
Pulses	-	-	0.8	0.2	0.3	3.1	0.8
Oilseeds	0.4	0.5	1.0	0.5	0.6	1.7	0.8
Potatoes	0.7	0.5	0.3	-	0.4	1.9	0.7
Vegetables	1.1	0.8	0.7	0.2	0.7	3.7	1.3
Condiments	0.2	0.1	0.3	-	0.2	0.6	0.2
Fruits	0.4	0.3	0.3	0.1	0.3	2.2	0.6
Others	1.0	3.9	0.4	4.4	2.1	5.0	2.6

Source: Regional Statistical Office, Rajshahi

TABLE V-1-3 AVERAGE YIELD OF RICE (1983-84 to 85-86)

Unit : kg/ha

	Aus		T. Aman		B. Aman		Boro		Average in Upazilla	
	LV	MV	LV	MV	Aver.	(LV)	LV	MV		Aver.
Niamatpur	860 (98)	1,954 (2)	876 (87)	2,047 (13)	1,364 (18)	1,042 (82)	1,659 (18)	2,922 (82)	2,672 (82)	1,312
Tanore	845 (87)	1,659 (13)	950 (86)	1,862 (14)	1,374 (38)	1,106 (62)	1,613 (38)	2,793 (62)	2,314 (62)	1,351
Godagari	830 (99)	1,742 (1)	839 (89)	2,102 (11)	1,447 (57)	1,014 (43)	1,613 (57)	2,858 (43)	2,148 (43)	1,349
Nachole	814 (91)	1,576 (9)	959 (87)	2,028 (13)	1,401 (16)	1,106 (84)	1,632 (16)	2,646 (84)	2,480 (84)	1,347
Average of Barind	853 (95)	1,682 (5)	891 (87)	2,038 (13)	1,392 (36)	1,080 (64)	1,620 (36)	2,818 (64)	2,386 (64)	1,338
Paba	876 (97)	1,540 (3)	894 (38)	2,120 (62)	1,595 (94)	1,060 (6)	1,540 (6)	2,175 (94)	2,139 (94)	1,088
Average of Total	859 (96)	1,658 (4)	893 (87)	2,045 (13)	1,429 (31)	1,067 (69)	1,613 (31)	2,673 (69)	2,343 (69)	1,310

Note: Figures in parenthesis indicate percent area of LV (Local Variety) and MV (Modern Variety)
Source: Regional Statistical Office, Rajshahi

TABLE V-1-4 AVERAGE YIELD OF NON-RICE CROPS (1983-84 to 85-86)

Unit : kg/ha

	Average of					Average of Total area	
	Niamatpur	Tanore	Godagari	Nachole	Barind area		Paba
Wheat L	-	1,198	-	857	1,140	1,226	1,160
M	2,305	1,918	2,056	1,871	2,057	2,332	2,160
Aver.	2,305	1,750	2,056	1,687	1,960	2,125	2,015
Jute	1,343	1,240	1,336	1,191	1,306	1,449	1,342
Sugarcane	-	-	42,225	(36,878)	42,225	45,821	44,023
Pulses	744	751	673	667	709	747	716
Oilseeds	554	673	537	575	585	649	598
Potatoes L	6,546	6,205	6,942	6,454	6,545	7,209	6,806
M	7,560	7,505	7,108	6,887	7,401	7,597	7,530
Aver.	6,649	6,815	6,987	6,608	6,746	7,413	7,070
Vegetables	6,650	6,131	6,011	5,301	6,023	7,468	6,312
Condiments	4,490	3,669	3,337	2,950	3,611	1,954	3,280
Fruits	10,934	9,533	6,361	4,407	7,809	5,965	7,440

Source: Regional Statistical Office, Rajshahi

TABLE V-1-5 NUMBER OF LIVESTOCK IN FIVE UPAZILAS
WITHIN THE STUDY AREA, JUNE 1987

	Cattle	Buffale	Seep	Goat	Duck	Poultry
Paba	78,270	575	1,259	32,225	10,560	125,590
Godagari	85,215	7,540	1,582	18,420	82,817	177,208
Tanare	96,000	58,000	35,000	42,000	75,000	85,000
Total	259,485	66,115	37,841	92,645	168,377	387,798

	Bovine	Seep & Goat	Duck & Poultry
1986-87	325,600	130,486	556,175
1983-84	126,126	133,261	444,028
86-87/83-84	258%	98%	125%

Source : District Livestock Office, Rajshahi

TABLE V-1-6 ANNUAL TOTAL CATCH OF INLAND WATER
FISH IN RAJSHAHI REGION

Waterbody	Area in hectare	Catch in metric tons	Catch (Kg) per hectare
River	20,991	10,594	495
Beels	19,849	8,932	450
Flood lands	-	3,512	-
Ponds	14,728 (100%)	8,031 (100%)	545
Cultured	4,493(30)	5,243(65)	1,167
Culturable	6,606(45)	2,247(28)	340
Derelict	3,629(25)	541 (7)	149
Total	55,568	31,069	-

Source : District Fishery Office, Rajshahi

TABLE V-1-7 NUMBER AND AREA OF PONDS IN THE
RELATED UPAZILAS

(area : ha)

		Government pond	Private pond			TOTAL
			Cultured	Culturable	Derelict	
Paba	No	40	1,043	1,431	748	3,262
	Area	15	203	285	164	667
Tanore	No	570	646	533	519	2,268
	Area	111	110	128	114	463
Godagari	No	200	117	851	438	1,606
	Area	346	228	132	40	746
Niamatpur	No	248	1,108	1,398	707	3,461
	Area	61	215	283	145	704
Nachol	No	183	700	838	467	2,188
	Area	80	136	128	86	430
Total	No	1,241	3,614	5,051	2,879	12,785
	Area	613 (20)	892 (30)	956 (32)	549 (18)	3,010 (100%)

Source : District Fishery Office, Rajshahi

Table V-3-1 FERTILIZER DOSE OF CROPS

	Without Project (Farmers' dose) kg/ha			Without Project (Farmers' dose) kg						
	Urea	TSP	MP	Urea	TSP	MP				
Aus	Broadcast	75	75	35	-	-	87	83	33	2,000
T. Aman	LV	80	80	40	-	-	87	83	33 (Green Manure)	-
Deepwater rice (DWR)	Broadcast	75	75	35	-	-	80	80	40	-
Boro	MV	188	188	88	-	-	180	130	60	5,000
Wheat	MV	75	75	37	-	-	163	99	35	2,000
Jute	-	62	25	35	-	-	110	25	50	1,000
Sugarcane	-	275	175	60	-	-	420	275	90	5,000
Pulses	Winter P. Summer P.	37 25	45 35	20 15	-	-	75 75	120 120	52 52	-
Oilseed	Mustard Sesame	120 -	80 -	60 -	-	-	138 76	138 120	37 46	-
Vegetables	Winter V. (Potato) Summer V. (Brinjal)	200 200	150 120	150 100	5000 6000	-	200 250	150 170	200 150	10,000 15,000

S or Zn deficient area : CaSO₄ 110~120kg/ha
ZnSO₄ 10~15kg/ha

TSP : Triple Super Phosphate

MP : Murate of Potash

Source: Agriculture Extension, Rajshahi Zone

Table V-3-2 SEED RATE AND PESTICIDE APPLICATION

	Seed rate (kg/ha)		Pesticide application per hectare				
	Without	With	Without	With			
Aus	100	30	Mixing of Bidrin 85 WSD & Dimuron 100 WSC	0.5ℓ	Sumithion 50% EC or Monochlorophos 40 WSC	1.1ℓ	×3
Deepwater rice	110	30	-	-	-	-	-
Boro	40	30	Same as T. Aman	-	Same as T. Aman	-	×2
Wheat	150	150	-	-	(Melathion 57% EC)	1.1ℓ	-
Jute	7	7	-	-	Bidrin 85 WSC	0.8ℓ	×2
Sugarcane	4,050	6,250	-	-	Diazinon 60% EC	1.7ℓ	×4
Pulses (Lentil) (Mungbean)	25	25	-	-	-	-	-
Oilseeds (Mustard) (Sesame)	14	14	-	-	(Melathion 57% EC)	1.1ℓ	-
Vegetable Winter Veg. (Potatoes)	1,600	1,700	-	-	Diazinon or Sumithion 50% EC	1.1	×2
Wummer Veg. (Brinjal)	0.1	0.1	-	-	-	-	×3

Source: Agriculture Extension, Rajshahi Zone

(Parenthesis denote pesticide against aphids if needed)

TABLE V-3-3 TARGET YIELD AND TOTAL PRODUCTION

Crops	Yield (t/ha)	Production (Ton)		
		Barind	Paba Flood Plain	Total
Rice (Total)		339,710	40,860	380,570
Aus	3.5	44,310	3,780	48,090
T.aman	4.0	168,800	21,600	190,400
T.DWR	1.5	—	1,080	1,080
Baro	5.0	126,600	14,400	141,000
Wheat	3.5	14,770	3,780	18,550
Pulses	1.2	4,812	1,944	6,755
Oilseed	1.0	630	540	1,170
Potatoes	12.0	2,520	3,240	5,760
Sugarcane	65.0	—	140,400	140,400
Jute	2.0	—	2,160	2,160

TABLE V-3-4 TARGET YIELD AND PRODUCTION IN BARIND AREA

	<u>Present</u>			<u>Without Project</u>			<u>With Project</u>		
	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)
Rice (total)	50,470	1.35*	67,920	50,470	2.28*	114,843	80,180	4.24*	339,710
Aus	7,980	0.89	7,102	7,980	2.0	15,960	12,660	3.5	44,310
T. aman	39,960	1.39	55,544	39,960	2.3	91,908	42,200	4.0	168,800
Deepwater rice	590	1.08	637	590	1.3	767	-	-	-
Boro	1,940	2.39	4,637	1,940	3.2	6,208	25,320	5.0	126,600
Wheat	2,490	1.96	4,880	2,490	2.3	5,727	4,220	3.2	13,504
Pulses	170	0.71	121	170	0.8	136	4,010	1.2	4,812
Oilseeds	340	0.58	197	340	0.7	238	630	1.0	630
Patatoes	210	6.75	1,417	210	8.0	1,680	210	12.0	2,520
Vegetables & Others	1,940	-	-	1,940	-	-	720	-	-
Total Cropped Area	55,620			55,620			89,970		
Net Cropped Area	42,200			42,200			42,200		
Cropping intensity	131.8%			131.8%			213.2%		

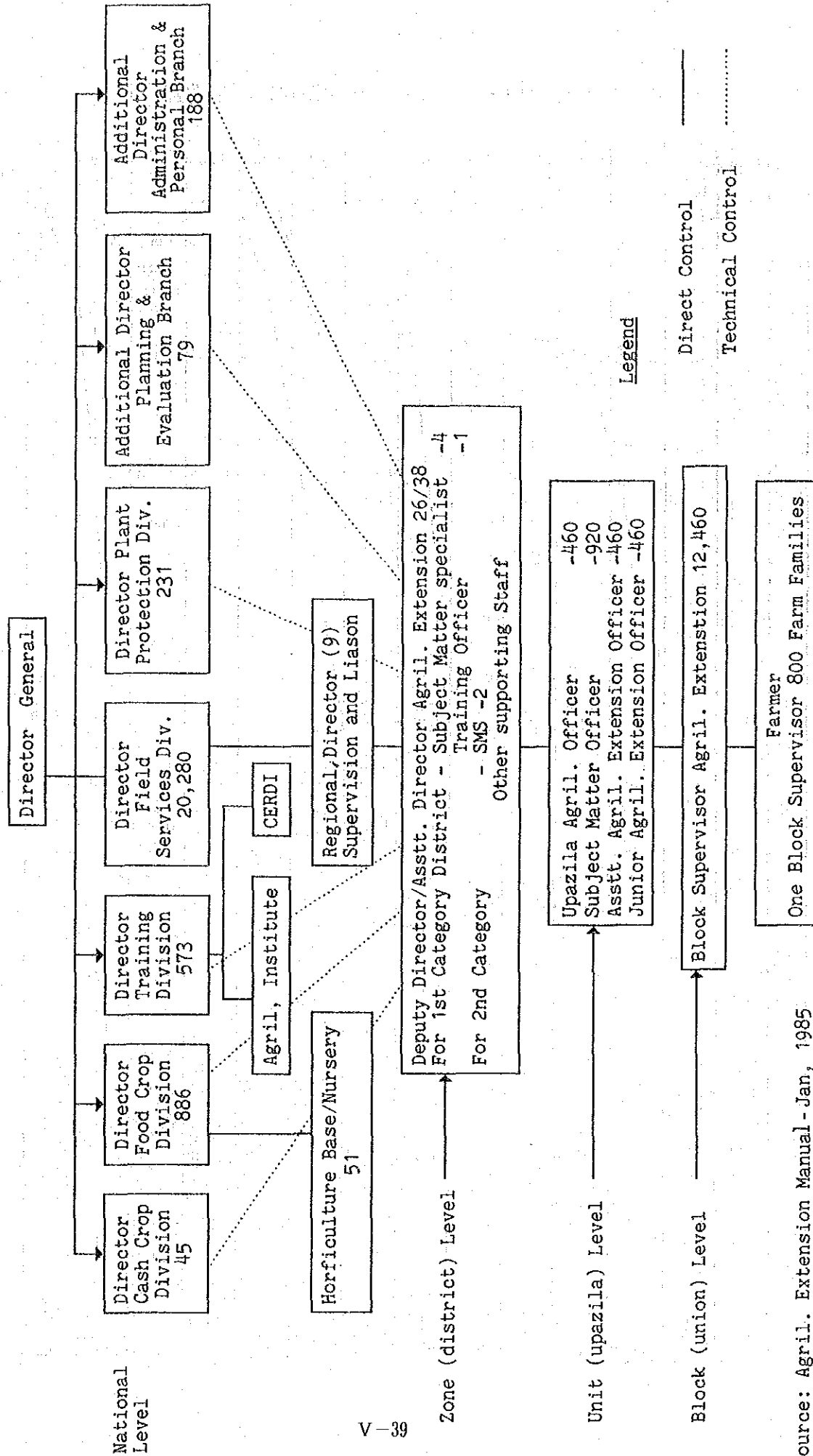
Note : * weighted average yield

TABLE V -3-5 TARGET YIELD AND PRODUCTION IN PABA FLOOD PLAIN AREA

	<u>Present</u>			<u>Without Project</u>			<u>With Project</u>		
	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)
Rice (total)	7,790	1.18*	9,237	7,960	1.97*	15,655	10,080	4.05*	40,860
Aus	3,370	0.89	2,999	3,450	2.0	6,900	1,080	3.5	3,780
T.aman	2,360	1.59	3,752	2,360	2.3	5,428	5,400	4.0	21,600
Deepwater rice	1,780	1.06	1,887	1,870	1.3	2,431	720	1.5	1,080
Boro	280	2.14	599	280	3.2	896	2,880	5.0	14,400
Wheat	1,230	2.13	2,620	1,530	2.3	3,519	1,080	3.5	3,780
Pulses	500	0.75	375	500	0.8	400	1,080	1.2	1,296
Oilseeds	270	0.65	175	270	0.7	189	1,080	1.0	1,080
Patatoes	300	7.41	2,223	300	8.0	2,400	270	12.0	3,240
Vegetables	320	7.47	2,390	590	8.0	4,720	450	12.0	5,400
Sugarcane	1,820	45.82	83,392	1,950	50.0	97,500	2,160	65.0	140,400
Jute	750	1.45	1,088	1,670	1.5	2,505	1,080	2.0	2,160
Fruits	350	8.10	2,835	350	8.1	2,835	360	12.0	4,320
Others	900	-	-	900	-	-	-	-	-
Total Cropped Area	14,230			16,020			17,640		
Net Cropped Area	9,000			9,000			9,000		
Cropping Intensity	158%			178%			196%		

Note : * weighted average yield

FIGURE V-1-1 AGRICULTURAL EXTENSION DEPARTMENT ORGANIZATION CHART



Source: Agril. Extension Manual - Jan, 1985

FIGURE V-1-2 PROPOSED CROPPING PATTERN

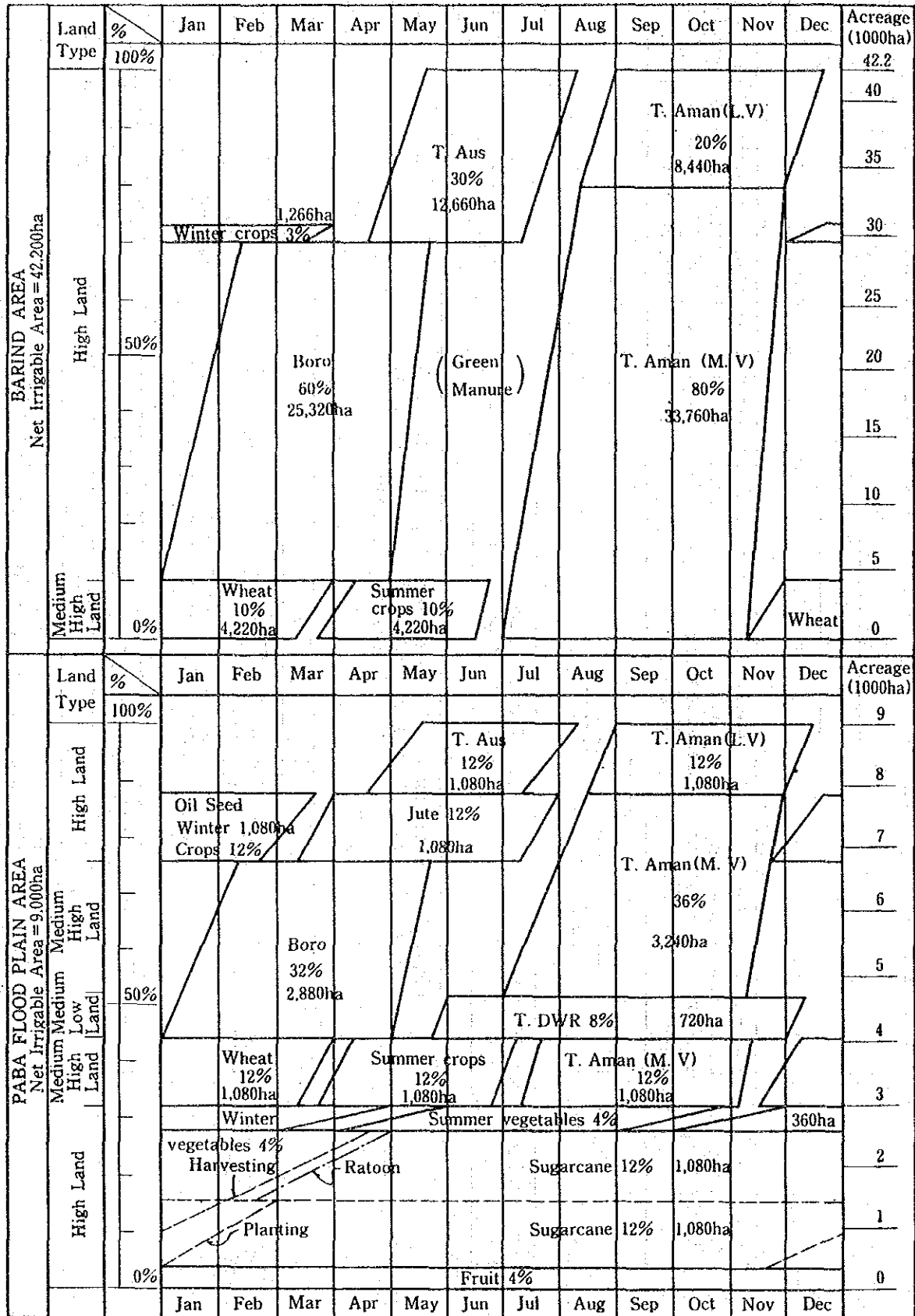
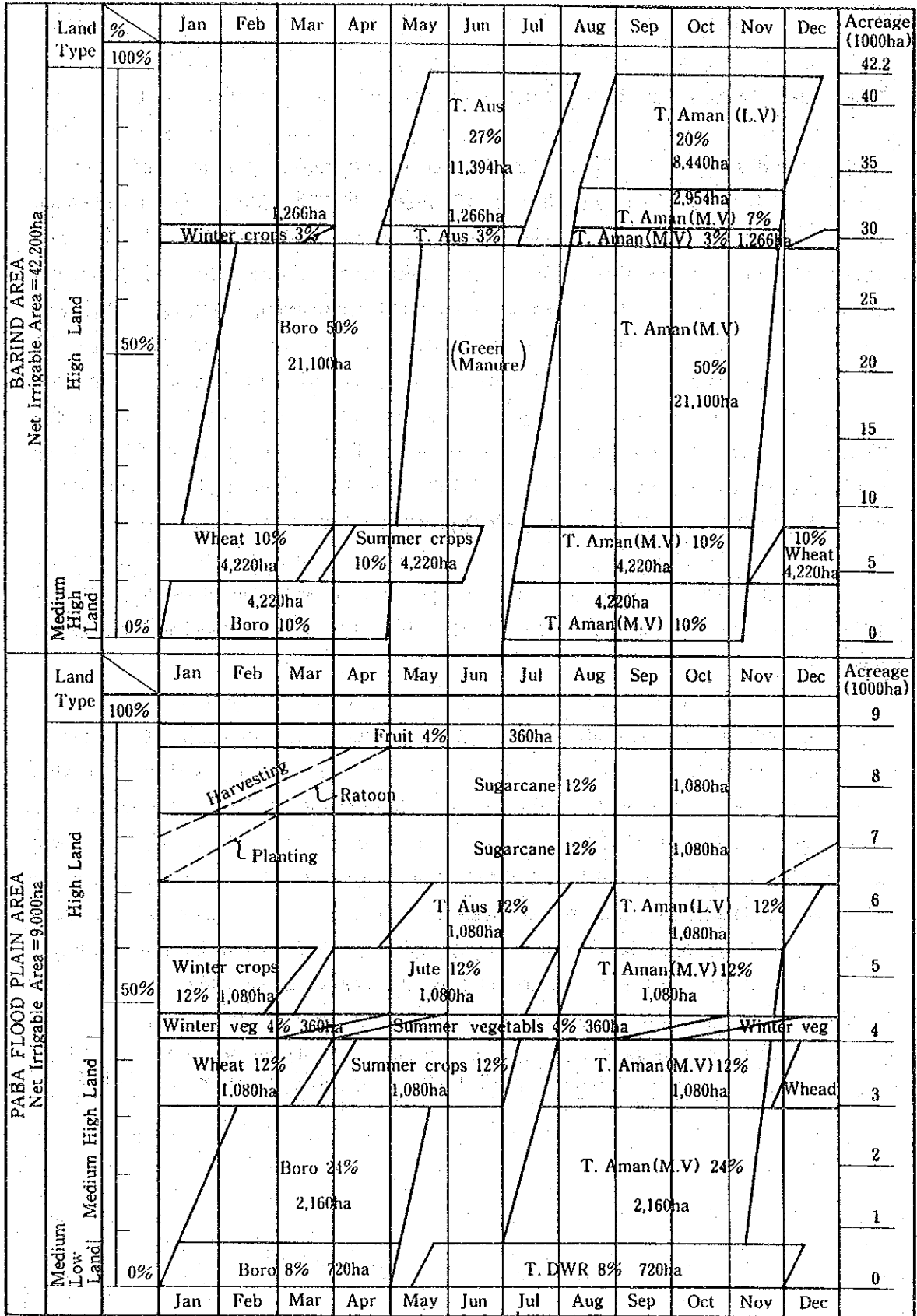


FIGURE V-1-3 PROPOSED CROPPING PATTERN BY LAND TYPE



4. Farm Size and Land Tenure

4-1 Farm Size

4-1-1 By Size of Operated Area

According to 1983-84 agricultural census, as shown in Table V-4-1, there are 81,040 farm households of which 39,238 (48%) are small-size group, 31,791 (39%) are medium-size group and 10,011 (12%) are large-size group in the Study area. Whereas, there are 613,331 farm households of which 370,008 (60%) are small-size group 191,662 (31%) are medium-size group and 51,661 (8%) are large-size group in Rajshahi Region. According to above, the proportion of small-size group is considerably lower and of large-size group is remarkably higher in the Study area as compared with those in Rajshahi region. And these farm households account for 66%, 71% and 73% of total households in the Study area, Rajshahi region and Bangladesh, respectively.

It is also noticed that the large-size group accounts for 12% of total farm households as compared with 8% in Rajshahi region and 5% in Bangladesh.

According to available information, the average size of operated area per farm household is 1.5 ha in the Study area, which includes operated area^{/*} of non-farm household. On the other hand, in regard to Bangladesh and Rajshahi region level, as operated area of farm households has been obtained from statistics of agricultural census (1983-84), the average size of operated area per farm household of the Bangladesh and Rajshahi region has been 0.9 ha and 1.2 ha, respectively, which does not include operated area of non-farm households.

^{/*} ... In Rajshahi region, the operated area of non-farm households accounts for only 1.2% of total operated area (1983-84 Agricultural Census).

Farm size of Paba Upazila assumes a different aspect compared with that of others. The proportion of small-size group is remarkably higher (64% of total farm households) and that of medium-size group is considerably lower (29%), besides, that of large-size group is about half (7%) of others. On the whole, farm size of Paba Upazila declines toward lower size, and the average size of operated area per farm household (including operated area of non-farm households) also is 1.1 ha.

Furthermore, in Barind area, the proportion of small-size group, medium-size group, and large-size group is 44, 42 and 14 percent of total farm households, respectively, and the average-size of operated area is 1.6 ha.

4-1-2 By Size of Owned Area

In Bangladesh, land reform has been enforced in 1972 and 1983-84 after her independence in 1971. As a result, farmers do not own cultivated land of 8 ha and above. Government could requisition and transfer that land to the landless.

Land holdings by size of owned area (including non-farmers) is shown in Table V-4-2.

The number of holdings of small-size group of owned area (up to 1.0 ha) is more than 1.5 times than that of holdings of small-size group of operated area (up to 1.0 ha), while the number of holdings of medium- and large-size groups of operated area are more than that of the same size groups of owned area, respectively, in either case. It is seemed that the holds of small-size group of owned area rent their owned land to landless and holdings of small- and medium-size groups of operated area, and also that the holdings of medium-size group rent their owned land holdings of medium- and large-size groups of owned area their owned land as operated area.

4-2 Land Tenure

According to the Land Occupancy Survey in 1977, owner holdings occupied 52 percent and owner-cum-tenant holdings occupied 47 percent which are the same as that in Rajshahi region. According to the farm-economic survey of Phase II, the landownership pattern in the Study area is as shown in Table V-4-3.

Owner holdings occupy 53% and owner-cum-tenant holdings occupy 30%, while tenant holdings occupy 17%. Accordingly, comparing to that of 1977, it is noticed that the proportion of owner holdings has almost remained unchanged, but that of owner-cum-tenant holdings is substantially reduced to the extent to which the tenant holdings have increased, i.e., owner-cum-tenant holdings have eventually merged into tenant holdings.

Farm households by size group show that large farmers have no tenant holdings, and medium farmers also have a few (12%), while small farmers and landless have owner holdings of 54 and 65% and tenant holdings of 24% and 35%, respectively.

In Paba area, it is noticed that owner holdings occupy 60%, while tenant holdings (21%) are more than owner-cum-tenant holdings (18%). In Barind area, it is noticed that 80% of total landless are owner holdings, namely, landless of 80% have no operated area with the exception of owned land. (See Table V-4-5.)

The ratio of leased out land to total owned land is 13%. Out of them, owned land of owner-cum-tenant holdings is 67% and owned land of absentee landowner is 33%. While, owner holdings are cultivating all of their owned land by themselves and their families.

In Barind area, absentee landowners exist there, and their owned area occupies 5% of total owned land and 33% of total leased out land. Moreover, out of total leased out land of absentee landowner that of large farmers occupies 78%. (See Table V-4-6.)

In this land tenure, by far the important form of tenancy is share cropping. As to share cropping, different systems exist but the most common one is a 50%-50% distribution of gross production quantities between tenant and landlord, the tenant taking care of all inputs. There are 2 types of fixed amount (before harvesting) and a fixed rate (after harvesting) in this common system. Necessarily, landlord is eager to enlarge owned land and is not eager to improve owned land.

The average plot size is found to be about 0.1 ha. Because of this fragmentation of their lands, the farmers frequently have to consult their neighbours on such matters as determining a cropping pattern or fixing a date for land preparation or harvesting. It is impossible to have access roads to all the plots. In many cases the owner is forced to leave out part of his land, because of the prevailing degree of fragmentation and dispersion.

Besides, landlessness which has the important implication in the analysis of land ownership consists of Landless I, Landless II, and Landless III.

According to agricultural census of 1983-84, the status of landlessness in the Study area, the Rajshahi region and the Bangladesh is shown in Table V-4-7.

This landlessness situation has important meaning as to the dearth of human basic needs, employment problem, social uneasiness in urban area and backwardness of agricultural productivity, etc., since half or almost nearly half of all households (47% in the Study area, 45% in the Rajshahi region and 49% in the Bangladesh) have been landless.

It is noticed that the proportion of Landless II in the Study area is larger as compared with that of the Rajshahi region and Bangladesh.

Besides, it is noticed that the proportion of landless reaches 64% of total households, especially that of Landless I reaches 27% compared with 4 to 10% for others, although the average of farm size of operated area is 1.9 ha (including operated area of non-farm) in Nachole Upazila. Furthermore, it is also noticed that the proportion of Landless III exceeds 20% of total households in Paba Upazila. It is seemed that this phenomenon is generated because Paba Upazila is in the suburbs of Rajshahi city.

5. Marketing

The main commodities of agricultural products traded in the Study area are paddy (rice), wheat, jute, sugarcane, etc.

The Government provides guaranteed support prices for paddy, wheat and sugarcane. Especially, the Government frames the institution of procurement programme for paddy and wheat which determines procurement prices and quantities. This focus of MOF's (the Ministry of Food) procurement operation is to guarantee minimum prices for farmers, sustain farmers' incentives to produce and assure a stable flow of reasonably priced foodgrain to urban consumers. Furthermore, the major improvement in foodgrain procurement policies which has conducted the announcement of procurement prices well ahead of the planting season has enabled farmers to take account of prices in their planting decisions. Certainly, it is considered that the present procurement programme of the Government provides adequate production incentives, because the present procurement price for paddy exceeds prevailing production costs by a margin which provides farmers with adequate financial returns. The factors influencing the performance of the price support scheme are the quantities procured relative to total production and procurement prices compared with those in alternative market outlets. Recently, procurement prices are often lower than the open market prices and procurement procedures are troublesome.

In case of paddy, the quantities procured by MOF have typically ranged from 2 - 6% of total production which corresponds to roughly 10 - 30% of paddy actually marketed.

The assembling markets by Upazila in the Study area are as follows:

<u>Name of Upazila</u>	<u>Assembling Markets</u>	<u>Principal Commodities</u>
1. Tanore	Tanore	Paddy and fish
	Mundamala Kalinganj	Cattle, vegetables Paddy, rice
2. Paba (including Boalia Rajshahi city)	Shaheb bazar	All commodities except cattle in retail price
	New market	-do-
	Talaimari	-do-
	Haragram	-do-
	Binodpur	all except cattle (retail)
	Naohata	Paddy, betel leaf, Potato, aram, cattle
3. Godagari	Baya	Paddy, pepper, banana, vegetables
	Damura	Paddy, rice
	Katakhali	Gur, cattle, sugarcane
	Bargachhi	Betel leaf, pulses
	Godagari Bidirpur Kakauhat Maishalbari	Paddy, rice, vegetable -do- -do- + cattle Cattle, paddy, wheat
4. Niamatpur	Niamatpur	Paddy, rice, wheat, pulse, onion, vegeta- ble, cow & goat poul- try, fish, meat, etc.
	Shangsail	-do-
	Battali hat	-do-
	Belkapur hat	-do-
	Sanichandi hat	-do-
	Chhara hat	-do-
	Shibpur hat	-do-
5. Nachole	Nachole	Paddy, fish, vegetable
	Kazla	-do-
	Mallickpur	Paddy, fish
	Saraichandi	Paddy, rice, mustard seed, cattle, vege- tables, fish
	Rajabari Bakail	-do- -do-

Source: Agricultural Marketing Directorate, Rajshahi.

The former is mostly on a small-scale basis. Producers are smaller farmers and their paddy is hulled by traditional dheki or by small mills. 15%^{/3} of surplus paddy actually marketed in the Study area. The latter is mostly on a large-scale basis. Producers are bigger farmers and their paddy is exclusively hulled by large mills. The products that pass through this channel are about 85%^{/3} of surplus paddy actually marketed in the Study area.

^{/3} .. Information from Agricultural Marketing Department, Rajshahi.

Local market prices of paddy by grading level as follows:

<u>Varieties</u>	<u>Grading Level</u>	<u>Price (Taka/md)</u>
		(1987)
HYV Boro	Grade II	240.0 (6.4)
HYV Aus	-do-	224.0 (6.0)
Jinga Sail	Grade I	320.0 (8.6)
HYV Aman	Grade I	240.0 (6.4)

Source: Agricultural Marketing Department, Rajshahi.

- Notes: 1) No scientific method applied for grading
 2) Figures in parentheses are price converted into unit Kg
 3) The support price of Government (including transportation bonus of Tk.

Sugarcane is bought and milled by the three sugar mills. The mills operate purchasing centres where the farmers can deliver their cane.

Depending on the sugarcane price large quantities are processed into gur at farm level by rather primitive means, though sugar mills have an overcapacity.

Farmers sell their jute to itinerant merchants or directly in the local market where it is sold to representatives from the jute mills or to other traders.

6. Local Government

As mentioned in 2-2-1, the representative local government called the Upazila Parishad which is headed by the elected Upazila Chairman consists of the elected Union Chairman and officials of most of the Upazila level department of the development officers. They are under control of the development offices, at the same time, they are now working under control of the elected Upazila Chairman who is the chief executive of the Upazila Parishad. It is seemed that they have the functions tied up with the will of the people and national policies for the development project (or programme) at the local level. There is the Upazila Nirbahi Officer who works as the principal staff officer to the Chairman of the Upazila Parishad but has no direct control/authority over other officers: Upazila Engineer, Upazila Agriculture Officer, Upazila Finance & Planning Officer and other officials in all major nation-building departments. (See Figure V-6-1.)

The national government takes measures to finance the local development programme to be undertaken by the Upazila Parishads.

Thus, the Upazila Parishad has become the focal point of all development activities at the local level programmes of their own on a reasonable scale and has also become the implementing authority for execution of the divisible components of national level projects and programmes.

7. Farmers' Association

Bangladesh has already an established tradition in cooperatives. Dating back as far as the early fifties, the Union Multipurpose Cooperatives (UMPC) exist. Despite its ambitious name, the UMPC mainly served the purpose of providing short-term credit to the farmers. The target group was not being reached by this system and the key positions in the cooperatives were held by well-to-do farmers, with widespread loss of confidence and interest as its consequence.

In the beginning of the sixties, the movement gained in strength after cooperatives were formed following the successful Comilla Experiment which was carried out under the responsibility of the Bangladesh Academy for Rural Development, that gave the cooperative a versatile and comprehensive character. The Comilla experiment gained wider recognition when the model was being used for nation-wide implementation after the establishment, in the early seventies, of the IRDP. The Integrated Rural Development Program advocated the use of a two-tier cooperative system which operated at the level of the village through primary cooperatives (KSS) which were federated at the Thana level in the TCCA. In 1983, the name of IRDP was changed into BRDB.

The traditional KSS in village which had been organized already before land under the Integrated Rural Development Programme have rapidly reorganized to KSS under BRDB.

IRDP did not initially undertake the establishment of cooperatives (BSS/MSS) for the landless poor. However, in response to criticism that KSS (farmers' cooperatives) served only richer farmers, IRDP tried to organize groups for the landless, and advocated the use of a two-tier cooperative system which operated at the level of the village through primary cooperatives (BSS/BMSS), which were federated at the Thana level in the TCCA under the Integrated Rural Development Program.

Besides, Thanas are upgraded Upazilas after the administrative re-organization carried out in 1984.

In the Third Five-Year Plan, an important policy has been framed to organize the landless and rural poor for improved distribution of income and pushing up the poor class in rural area.

According to Cooperative Societies Rules, a KSS/BSS must comprise with minimum 10 farmers of 18 years or more in age, and must be registered as per provisions in the Bangladesh Cooperative Laws. A KSS/BSS is managed by Managing Committee comprised of minimum 6 to

maximum 12 elected members. They will prepare plan of operation and budgets, arrange funds, maintain accounts, obtain books of account audited, hold regular meetings, maintain reserve fund, distribute profits to the members/shareholders in appropriate proportion and arrange for settlement of disputes, etc.

The UCCA at Upazila level is the organization federating all KSS and BSS (MSS) in villages under equality of condition.

In addition to support services to the primary cooperatives and the UCCAs the BRDB provided rural development components via the UCCA Training and Development Centre (UTDC), the Upazila Irrigation Program (UIP) and the Rural Works Program, and established a special bank for the financing of the cooperatives, i.e., the Bangladesh Samabaya Bank (Bangladesh Cooperative Bank, Ltd.).

This UCCA-KSS/BSS/MBSS system has been playing an important role to carry out economic activities such as crop production, marketing, establishment of irrigation equipment, and various types of off-farm activities including rice, husking, bamboo and cane works, handlooms, silk and jute craft, and to supply and distribute the funds for the above economic activities.

Besides, the UCCA-KSS/BSS systems are being encouraged to act as private wholesalers for fertilizer and are given credit by BADC against a bank guarantee. Because the Government would continue to reduce sector involvement in fertilizer distribution in favour of the private traders since the New Marketing System (NMS) for fertilizer was introduced to improve the efficient distribution and pricing of fertilizer by maximizing the involvement of the private sector, both wholesale and retail.

Moreover, in area under BRDB Project or Programme, the existing UCCA-KSS/BSS system could form Irrigation Management Committee among themselves when necessary; accordingly, the potential farmers of irrigation systems have not organized separate water supply association. The UCCA-KSS/BSS system would serve as saucer of collection organization of the irrigation water rates which may be specified in the notification regarding publicly-funded irrigation systems according to promulgation of Bangladesh Irrigation Water Rate Ordinance of 1983 and Water Rates Rules of 1984, and enable the Government to intensify current drives in maximizing recovery of operation and maintenance (O&M) costs from beneficiaries of the irrigation systems.

The status of KSS/BSS in the Study area is as shown in Table V-7-1.

8. Agricultural Credit

Bank operations in Bangladesh started in 1973. As of 30 September 1985 the Bank provided 61 loans amounting to US\$1.665 million for 55 projects.

The sectoral distribution of the total loans US\$1,665 million is as shown in Table V-8-1.

The heavy concentration of bank lending in agriculture (51% of total lending) reflects the dominance of this sector in the economy of Bangladesh.

The bank's operational strategy for Bangladesh, which is in accord with the Government's priorities, places primary emphasis on agriculture, energy and human resource development. Basically, the economic potential of Bangladesh is mainly to be found in these areas. Especially, agriculture is the most important sector, being the major source of income and employment, and also provides the food supplies needed by a rapidly rising population. The assistance of the Bank to the agriculture sector has so far been concentrated in traditional areas

such as irrigation, and in line with the Bank's policy on program lending, the Government procurement and price support for major crops, especially foodgrains, and subsidized provisions of farm inputs, such as fertilizers, are included.

The Government would expand availability of agricultural credit and at the same time improve the recovery of maturing loans. The rate of recovery of agricultural credit would be raised from about 55% in FY 1986 to 60% in FY 1987.

There are both institutional and non-institutional sources of agricultural credit in Bangladesh. The institutional sources of agricultural credit are Bangladesh Krishi Bank*1 (BKB), Sonali Bank*2, Bangladesh Samabaya Bank*3, and other nationalized commercial Banks as shown in Table _____. BKB supplies 60% (67% in actual) of institutional credit to agriculture.

These nationalized commercial Banks have widespread network of branches through all over the country. They have 280 branches in Rajshahi region and 28 branches (if including Boalia Upazila = Rajshahi city; 68 branches) in the Study area.

Financial resources provided for institutional credit have been limited, which has been the major constraint to the wider use of agricultural institution credit by the small farmers. However, the total institutional credit given to agriculture has increased by about 300% between 1980/81 and 1984/85 (or from Tk.3,734 million to Tk. 11,319 million). But 80% of the total credit requirement of agriculture are still met from non-institutional sources for which the annual interest rate exceeds 50%.

The duration of loans and method of repayment on agricultural institution credit is as shown in Table V-8-3.

Besides, the government has recently undertaken changes in agricultural credit policy in order to make lending institutions more viable in the long term.

Agricultural institution credit is channelled to the borrowers by two routes: one is directly, the other is through UCCA-KSS/BSS/MBSS system. As to the proportion of both channels to total agricultural credit, the former is about 60% and the latter is about 40%.

As shown in Table V-8-4, borrowers of the former will be able to rent at interest of only 16%, while borrowers of the latter have to rent at interest of 19% (short-term loan) to 16% (medium-term loan) although they could rent without any collateral. Besides, including penal interest, loan interest is 22% in all cases.

Moreover, borrowers through UCCA-KSS/BSS/MBSS under Project of BRDB are able to rent at interest which is relatively low, i.e., that of short-term and medium-term is 14% and 12%, respectively (penal interest, 6%). (See Table V-8-5.)

According to a summary on the activities of Bangladesh Krishi (Agricultural) Bank (BKB), term-wise distribution of loans, distribution of loans by size of holdings and loan distribution by size of the loan is given as follows:

- 1) Term-wise distribution of loans - as % of total loans Tk. 6,147 million, 1984/85). Short-term loan is 59%, medium-term loan is 41% and long-term loan is 10%. The proportion of short-term loan is overwhelming.
- 2) Distribution of loans by size of holdings - as % total borrowers and loan (1984/85), landless and up to 1.0 hectares farmer's group is 76% and 49%, over 1.0 to 3.0 hectares farmers' group is 19% and 22%, over 3.0 to 5.0 hectares farmers' group is 1% and 16%. The lending to landless and small farmers is very large in number.

3) Loan distribution by size of the loan - as % of total borrowers and loan (1984/85), up to Tk. 1,000 class is 12% and 2%, over Tk. 1,000 to 3,000 class is 43% and 19%. Over Tk. 3,000 to 10,000 class is 42% and 34%. Over Tk. 10,000 to 20,000 Class is 1% and 2%, over Tk. 20,000 to 50,000 class is 2% and 20% and over Tk. 50,000 class is 1% and 33%. Putting together over Tk. 1,000 to 3,000 class and over Tk. 3,000 to 10,000 class proportion of borrowers and the loan amounts to 85% and 33%, respectively, and shows that size of loan per case is comparatively petty. But it is noticed that the borrowers of loan of over Tk. 50,000 are extremely few but the loan accounts to 33% of total loans. (See Tables V-8-6, V-8-7, and V-8-8.)

9. Farm Economy

Farm economic survey has been made in order to grasp social economical condition of the farmers by size of operated area and landless farmers to a total of 500 households of farmers and landless farmers, viz., 50 households per village out of 2 villages in Paba area and 8 villages in Barind area.

9-1 Family Size and Occupational Status of Farm Households

Family size of the farmers is as shown in Table V-9-1.

Average family size is 6.3 persons, but the family size of large-size farmers (holding operated area of 3.0 ha and above) is 9.4 persons, which is twice as large as that of the landless farmers shown 4.7 persons. The large-size farmers in Paba area have average family size of 12.6 persons and as the farmers become larger, they adopt a large family system including relatives and are trying to concentrate owned land and maintain labor power. It should be given attention that the large farms adopt fundamentally farming practice of small size farmers; viz., the system of labor intensity and are trying to obtain labor power rather than aim at modern farming operation through the

introduction of farm machines and modern farming practice, and on the other hand, although 55% of family labour power is occupied with owned land at full time, 13% of it is occupied with non-agriculture at full time hand. As for the medium-size farmers (holding operated area from 1.0 to 3.0 ha), 62% of family labour power is occupied with owned land at full time. As for the family labour power occupied with owned land, the small-size farmers are 89%, the medium farmers are 88% and the large farmers are 83%. The family labour power of small-size farmers occupy with owned land and 45% of them occupy with other farms as agricultural labours at the same time.

9-2 Status of Leased Out and in Land

Table V-9-2 shows the balance sheet of the farm land. Based on all surveyed farmers, the operated lands exceed the owned lands and the leased in lands exceed the leased out lands. The small and medium-size farmers lease in lands of area which correspond each to 41% and 30% of their owned lands as a tenant farm land and are trying to enlarge their operated area. In the large size farmers, the leased out lands exceed the leased in lands, but both area of them correspond to under 10% of the owned lands. The table also shows that the large-size farmers operate almost all of their owned land by themselves and do not adopt the enlarging systems of operated area by a tenant. Besides, in the small-size farmers, it is noticed that the leased out lands came up to 17% of the owned lands which stand out as compared with those of the medium and large size farmers. Though they are assumed the form of leased out lands, it is supposed that in some cases they have been actually lost their ownership.

9-3 Distribution to Home Consumption and Sold of Produced Foodgrain

Table V-9-3 shows the distribution to home consumption and the sold of produced foodgrain.

Based on all surveyed farmers, in case of paddy, about 30% produce is distributed to home consumption and about 60% is sold or applied to gain an income. In case of wheat, about 20% produce is distributed to home consumption and about 60% is sold. Except landless farmers that sell rice at market of only 3% of production, the small-size farmers sell about 30%, the medium-size farmers, about 57% and the large-size farmers, about 78%. It seems that there are remarkable differences among its classes. As to the selling amount per household, the small-size farmers are 0.53 t, the medium-size farmers are 2.76 t and the large size farmers are 11.17 t. The selling income of the large-size farmers is much bigger than that of the small or medium-size farmers. Therefore, if 1,925 kilo calories which are the average calorie intake per capita per dya of the Bangladesh people are taken from foodgrains which each class distributes to home consumption, the landless farmers fulfill only 14%, the small-size farmers do 68%, the medium-size farmers do 92% and only the large-size farmers do 100%. When it is thought that the latter only is fulfilled, it can be said that the large-size farmers are in much richer condition than the other classes.

9-4 Farm Household Income and Expense

Table V-9-4 shows the actual status of farm household by operated area size.

Based on all surveyed farmers, average gross income of farm household per household is about 40,000 Tk of which 60% is agricultural gross returns and 40% is non-agricultural receipt. By operated area size, small-size farmers get twice gross income of that of landless farmers, and medium-size farmers get twice gross income of that of small-size farmers, whereas large-size farmers get about 133,000 Tk of gross income which correspond to 3.32 times of that of medium-size farmers. Class which agricultural gross returns occupy the most high proportion is medium-size farmers, i.e., about 70% out of household gross income, whereas large-size farmers occupy only about 60%. The

results show that large-size farmers get non-agricultural receipt from managing mill factory or transport industry based on their holding fund and labour power, or renting concentrated owned land.

Based on the farm household's net income, the large size farmers get remarkably high income, i.e., 82,000 Tk, as compared with about 13,000 Tk of small and medium-size farmers. In net income per capita also, the same phenomenon is seen. This fact shows that the difference of income between large-size farmers and small- and medium-size farmers is extremely remarkable.

Each class get more non-agricultural net income than agricultural net income, together, and then farm-household net income of medium-size farmers also makes a complete change and occupied with more non-agricultural income than agricultural income (i.e., about 60%).

According to Household Expenditure Survey, 1981-82, in rural area, the class which takes 1,600 kilo calories (kcl) per capita per day, viz. the lowest calories, which human is able to exist is that of getting income of 500-749 Tk per household. The class which takes 1,925 kcl, viz. the national average calories - those which get an income of 1,000-1,249 Tk per household. The class which takes 2,200 kcl and above, viz., intake of necessary calories - those which get an income of 2,000-2,499 Tk per household. Based on the surveyed farm household, the landless farmers whose average income per household is 657 Tk can take only the lowest calories and small-size farmers whose average income per household barely take the average calories. Even the medium-size farmers whose average income per household is 1,749 Tk can take 2,153 kcl which are a little lower than 2,200 kcl. On the other hand, based on the monthly household expenditure per capita and according to the above survey, 2,290 kcl is taken per capita per day in case of expending 200-249 Tk; accordingly the medium-size farmers whose monthly average expenditure per capita is 232 Tk seems to take 2,200 kcl.

As mentioned above, the medium-size farmers will be the poor class which is under-nourished in case of the former point of view, and will be not that class in case of the latter point of view. In either case, it is said that the medium-size farmers are on a borderline to poor class.

Also, on the analogy of distribution status of farmers and landless farmers in the Project area, it is estimated that the farmers belong to poor class in the Project area which is under-nourished will reach 64% to 90% of all farmers.

The degree of fulfilling household expenditure with agricultural net income is low in small and medium-size farmers, viz., 27% and 42%, respectively. It is noticed that large-size farmers also cannot fulfill their household expenditure with agricultural net income only, that is, no more than 86%.

The small and medium-size farmers get farm household economic surplus, but it is that of 1,000 Tk or less which is lower beyond compared with 45,000 Tk of large-size farmers. Based on the farm household economic surplus per capita also, the small and medium-size farmers get 130 Tk or less, whereas large-size farmers get 4,770 Tk.

9-5 Household Expenditures

Table V-9-5 shows a breakdown of household expenditures. High expenditures to foodgrain and low expenditure to education are remarkable. The landless farmers allocate 75% of household expenditures to foodgrain, moreover, of which 79% is paid in cash, on the other hand, the expenditures allocated education are only 0.2% of that. Whereas, large-size farmers allocate 52% of household expenditures though it is no cash and the expenditures allocated education are limited to 2.0% of that. Based on the household expenditures per household of all surveyed farmers, expenditures to foodgrain and education are 61% and 1.2% of that, respectively. Besides, according to the above mentioned Household