

Soil fertility (5 classes):

usually soil organic matter content has been considered as an indicators for the available nutrient status of the soil & indirectly it reflect with soil textures also. The soil fertility approach is as follows ;

- (N₀) Fertile soil all soil textures
- (N₁) Infertile soil sand/Loamy sand

Organic matter classes are

- (O₁) High >3.44%
- (O₂) Medium 1.72 - 3.44%
- (O₃) Low < 1.72%

Soil permeability (3 classes):

refers to the state of water movement within the soil mass. The classes are ;

- (P₀) Rapid > 350 cm/day
- (P₁) Moderate 12-350 cm/day
- (P₂) Slow < 12 cm/day

For the present purpose, the factors flood hazard and soil salinity hazard do not taken into consideration because, the entire Study area is under flood embankment protection and all the soils throughout their profile is mon-saline.

5.2 Land Characteristics and Land Qualities

Land comprises the physical environment which includes soils, relief climate, hydrology and vegetation etc. Natural resources are defined, identified, mapped and expressed in report form. The degree of information varies with the scale, intensity and nature of a study.

A land characteristics : is an attribute of inherent land properties that can be measured or estimated, e. g. soil texture, structure, soil reaction, water holding capacity, bulk density.

A land quality : is a complex attribute of land, functional properties, act in a distinctive manner and influence the suitability of land for a specific kind of use. It determines the production and management condition of a kind of land use.

A land improvement : is a activity which causes beneficial change in the qualities of land itself. It is usually classified as major - substantial & reasonably permanent improvement and minor - relatively small effect or non- permanent or both.

Eight items for land characteristics and qualities are taken into consideration for the Study area as shown in the Table V.5.1. The assessment are done only for major soil units.

The land factors are used for rating the crop suitability classification by matching crop requirement to the land type, edaphic and land forms conditions. All the lands in the Study area is capable of producing a desired crop if limitations are removed or substantially reduced by improving management and production inputs if economically feasible. There are five classes of degree of limitations for crop production. They are ;

- (L₀) - No or slight limitation
- (L₁) - Moderate imitation
- (L₂) - Severe limitation
- (L₃) - Very severe limitation
- (L₄) - Extreme severe limitation

In order to determine the suitability of a soil for any of the land use types or individual crops, the total number and the degree of limitations as provided by the land factors classes has been taken into consideration. Four Land suitability classes are recognised and their short descriptions are given below :

High suitability (S₁)

Soil has no/slight limitations and within the constraints of the kind of management specified has a high potential productivity.

Moderate Suitability (S₂)

Soil has a number of slight and/or moderate limitations that renders it less production than soils in class S₁

Marginal Suitability (S₃)

Soil has number of slight moderate and severe limitations and its productivity is very low. Within the constraints of specified management, productivity of the soil is difficult to improve.

No Suitability (N)

Soil has a large number of limitations, including one or more severe limitations. The potential productivity is very low and the soil generally is not used for the land use type or crop under consideration. Within the constraints of the specified kind of management, the productivity cannot be improved. Yield rate is less than 20% of maximum yield rate.

5.3 Crop Requirement

Crop-requirements refer to a set of land characteristics and qualities that influence the production and management conditions of a specific crop. Ten (10) crops are taken into consideration for the Study area. The requirements assessment are shown in Table V.5.2.

5.4 Land Suitability Classification

Land suitability classification of the Study area are made according to the land quality and crop requirement mentioned above and the results are shown in Table V.5.3, and illustrated on Land Suitability Map compiled in Drawing of a separate volume.

5.5 Description of Land Suitability Mapping Units

(1) Mapping Unit No.1

- Soil unit 2a: Bonarpara, highland 3,900 ha (6.6%)
- Soil unit 3a: Chilmari, highland 500 ha (0.8%)
- Soil unit 5a: Gangachara, highland 10,400 ha (17.5%)

The suitability unit covers about 14,800 ha and 24.9% of the total area. The soils are highly suitable for Aus (local improved variety:LIV), T. Aman (LIV), Jute (HYV), Wheat, Maize, Ground nut, Oil Seeds, Potato, Sugarcane & Orchard and moderately suitable for T. Aus (HYV), Boro (HYV), Tobacco with irrigation and proper application of organic matter and chemical fertilizers along with improved seeds and modern management practices.

(2) Mapping Unit No.2

- Soil unit 8a: Palasbari, highland	4,800 ha	(8.1%)
- Soil unit 8b: Palasbari, medium highland	1,100 ha	(1.9%)
- Soil unit 9a: Pirgacha, highland	4,000 ha	(6.7%)

This suitability unit covers about 9,900 ha and 16.7% of the total area. The soil are highly suitable for Aus (LIV), Jute (HYV), Wheat, Maize, Oil seeds, Sugarcane and Orchard. Moderately suitable for T. Aus (HYV), T. Aman (HYV), Ground nut, Oil seeds & Tobacco. Marginal suitable for Boro (HYV), with irrigation and application of organic matter, Chemical fertilizers along with improved seeds & modern management practices.

(3) Mapping Unit No.3

- Soil unit 2a: Bonarpara, medium highland	1,400 ha	(2.4%)
- Soil unit 3b: Chilmari, medium highland	700 ha	(1.2%)
- Soil unit 5b: Gangachara, medium highland	1,400 ha	(2.4%)

This suitability unit area covers about 3,500 ha and 5.9% of the total Study area. The soils are seasonably shallowly flooded upto 90 cm and highly suitable for Aus (LIV), T. Aus (HYV), T. Aman (HYV), Jute (HYV), Wheat, Maize and Potato, Moderately suitable for Sugarcane, Boro (HYV), Oil seeds and Groundnut with the introduction of irrigation, application of organic matte, chemical fertilizer along with improved seeds and modern management practices.

(4) Mapping Unit No.4

- Soil unit 1b: Amgaon, medium highland	2,900 ha	(4.9%)
- Soil unit 4b: Farabari, medium highland	5,700 ha	(9.6%)
- Soil unit 6b: Kaunia, medium highland	12,600 ha	(21.2%)
- Soil unit 7b: Laskara, medium highland	1,500 ha	(2.5%)
- Soil unit 11b: Ulipur, medium highland	600 ha	(1.0%)

This suitability unit covers about 23,300 ha and 39.2% of the total area. They are seasonably shallowly flooded and highly suitable for growing Boro (HYV), T. Aus (HYV), T. Aman (HYV) and Jute (HYV). Moderately suitable for Wheat, Maize, Potato and Oil seed with irrigation and improved management along with application of organic & chemical fertilizing. Sugarcane and Groundnut are marginal suitable

(5) Mapping Unit No.5

- Soil unit 1c: Amgaon, medium lowland	600 ha	(1.0%)
- Soil unit 4c: Farabari, medium lowland	700 ha	(1.2%)
- Soil unit 6c: Kaunia, medium lowland	400 ha	(0.7%)
- Soil unit 7c: Laskara, medium lowland	200 ha	(0.3%)
- Soil unit 10c: Uttargaon, medium lowland	2,500 ha	(4.2%)
- Soil unit 11c: Ulipur, medium lowland	500 ha	(0.8%)

The suitability unit covers about 4,900 ha and 8.2% of the total area. The soils are moderately deeply flooded upto 1-2 meter in the rainy season and are highly suitable for Boro (HYV) & Deep water Aman. Moderately suitable for Aus (LIV), Jute (HYV) and T. Aman

(HYV). Marginal suitable for Wheat, Maize, Groundnut and Oil seed with the introduction of irrigation, high inputs and improved management practices.

(6) Mapping Unit No.6

- Soil unit 12b: Sandy, silty alluvial complex, medium highland 700 ha (1.2%)
- Soil unit 12c: Sandy, Silty alluvial complex, medium lowland 800 ha (1.3%)

This suitability unit covers about 1,500 ha and 2.5% of the total area. The soils are seasonably shallowly to moderately deeply flooded. They are moderately suitable for T. Aman (LIV), Ground nut and Potato, Marginal suitable for Deep water Aman, Sugarcane, Oil seed, Wheat and Maize because of low moisture holding capacity and low organic matter. The soils are not suitable for irrigated wet land crops.

Table V.1.2 Soil Association Identified in the Reconnaissance Soil Survey (1968/69)

Map Code	Soil Associations	%
1. 3.	Teesta alluvium complex	2
2. 4.	Teesta alluvium- Chilmari	6
3. 5.	Pirgacha-Palashbari-Bonarpara Association	7
4. 7.	Pirgacha-Angaon Association	5
5. 10.	Palashbari-Bonarpara Association	2
6. 16.	Gangachara-Kaunia Association	63
7. 17.	Bonarpara-Farabari-Pirgacha Association	6
8. 25.	Farabari-Uttargaon Association	2
9. 29.	Kaunia-Laskara Association	5
Total		88

Table V.1.3 Composition of Soil Series in Soil Associations of the Soil Reconnaissance Survey (1968/69)

(unit:%)

Soil Series	Soil Association Mapping Code in Reconnaissance Soil Survey (1968/69)									
	3	4	5	7	10	16	17	25	29	
1 Amgaon	-	5	1	25	-	5	-	-	-	
2 Bonarpara	-	-	25	10	20	1	25	-	1	
3 Chilmari	3	-	-	-	5	-	-	-	-	
4 Farabari	-	-	5	1	5	5	20	45	10	
5 Gangachara	1	20	1	-	10	30	5	5	10	
6 Kaunia	-	-	1	-	5	25	2	10	40	
7 Laskara	-	-	-	-	-	-	-	2	20	
8 Palashbari	-	-	25	10	40	1	15	-	-	
9 Pirgacha	-	-	30	40	3	5	20	2	-	
10 Uttargaon	-	-	-	1	-	2	2	25	5	
11 Sandy Alluvium	30	10	-	-	-	-	-	-	-	
12 Silty Alluvium	45	25	-	-	-	-	-	-	-	
13 Bajra	1	-	-	-	-	-	-	-	-	
14 Domar	-	-	1	-	-	-	2	-	-	
15 Hasnabad	-	-	-	-	-	5	-	-	-	
16 Jamun	-	-	-	-	-	2	-	-	-	
17 Menanager	-	-	-	-	-	2	-	-	-	
18 Shaghata	5	10	-	-	-	-	-	-	-	
19 Ulipur	-	-	-	-	-	5	5	-	-	
20 Sarala	-	-	-	-	-	-	3	-	-	
Miscellaneous*	13	30	11	13	12	11	11	3	14	
Total Area	2	6	7	5	2	63	6	2	5	

Remarks: Miscellaneous includes homestead, water bodies etc.

Note: Most of the Soil Association 3 and 4 are extending outside the embankment.

Table V.2.1 Soils Series in the Study Area

Mapping Code	Soil Series	Area	
		ha	%
1.	Amgaon Series	3,500	5.9
2.	Bonarpara Series	5,300	8.9
3.	Chilmari Series	1,200	2.0
4.	Farabari Series	6,400	10.8
5.	Gangachara Series	11,800	19.9
6.	Kaunia Series	13,000	21.9
7.	Laskara Series	1,700	2.9
8.	Palashbari Series	5,900	9.9
9.	Pirgacha Series	4,000	6.7
10.	Uttargaon Series	2,500	4.2
11.	Ulipur Series	1,100	1.9
12.	Sand & Silty Alluvium Complex	1,500	2.5
	Sub-total	57,915	97.5
	Water bodies	1,500	2.5
	Grand total	59,400	100.0

Table V.2.2 Distribution by Textural Class

Textural Classes	Area	
	ha	%
1 Medium textured soils (SL, L, Sil)	29,500	49.7
2 Medium fine textured soils (Cl, Sicl)	23,300	39.2
3 Fine textured soils (Sic,C)	5,100	8.6
4 Water bodies	1,500	2.5
Total	59,400	100.0

Table V.2.3 Land Type & Soil (Area and Percentage)

Land Type	Mapping Code	Soils Series	Area	
			ha	%
F0	a	Highland ; Flood Depth:< 30 cm		
	2a	Bonarpara	3,500	
	3a	Chilmari	500	
	5a	Gangachara	10,400	
	8a	Palashbari	4,800	
	9a	Pirgacha	4,000	
		Sub-total	23,600	39.7
F1	b	Medium Highland ; Flood Depth:30 - 90 cm		
	1b	Amgaon	2,900	
	2b	Bonarpara	1,400	
	3b	Chilmari	700	
	4b	Farabari	5,700	
	5b	Gangachara	1,400	
	6b	Kaunia	12,600	
	7b	Laskara	1,600	
	8b	Palasbari	1,100	
	11b	Ulipur	600	
	12b	Sand & Silty alluvium complex	700	
		Sub-total	28,600	48.1
F2 & F3	c	Medium Lowland ; Flood Depth:> 90 cm		
	1c	Amgaon	600	
	4c	Farabari	700	
	6c	Kaunia	400	
	7c	Laskara	200	
	10c	Uttargaon	2,500	
	11c	Ulipur	500	
	12c	Sand & Silty alluvium complex	800	
		Sub-total	5,700	9.6
	Water bodies	1,500	2.5	
	Grand Total	59,400	100.0	

**Table V.2.4 Correlation of Soils of the Study Area with
USAD Taxonomy Soil Classification**

Order	Sub-order	Great group	Sub-group	Soil series
Entisoils 1,500 ha (2.5%)	Aquent	Fluvent	Typic Fluvent	Silty Teesta Alluvium
		Psamaquent	Typic Psamaquent	Sandy Teesta Alluvium
Inceptisoils 56,400 ha (95.0%)	Aquept	Haplaquept	Typic Haplaquept	Gangachara, Kaunia, Laskara
			Aeric Haplaquept	Amgaon, Banarpara, Chilmari Farabari, Ulipur, Uttargaon
	Ochrept	Dystrochrept	Aquic Dystrochrept	Palashbari
			Typic Dystrochrept	Pirgacha

**Table V.2.5 Correlation of Soil Series with
FAO/UNESCO Soil Map Legend**

Unit	Code	Sub-Unit	Code	Soil Series
1 Gleyic Cambisol	Bg	Dystri-Gleyic cambisol	Bgd	Pirgacha
2 Eutric Gley sol	Ge	Chromi-Eutric Gleysol	Geb	Amgaon, Chilmari, Farabari Gangachara, Kaunia, Laskara Palasbari, Ulipur, Uttargaon
3 Dystric Gleysol	Gd	Histi-Dystric-Gleysol	Gdb	Bonarpara
4 Eutric Fluvisol	Je	Chromi-Eutric-Fluvisol	Jeb	Sandy alluvium, Silty alluvium

Table V.2.6 Correlation of Soils with the General Soil Type

General Soil Type	Soil series (Texture)	Area ha	%
1 Non-calcareous Allvium Soils	Sandy alluvium (SL/L), Silty alluvium (Sil)	1,500	2.5
2 Non-calcareous Grey Floodplain Soils	Amgaon (Sicl), Chilmari (Sil), Gangachara (Sil), Kaunia (Sicl), Ulipur (Sic/c)	30,600	51.1
3 Non-calcareous Brown Floodplain Soils	Palasbari (Sil), Pirgacha (Sil)	9,900	16.7
4 Non-calcareous Dark Brown Floodplain Soils	BonarPara (Sil), Farabari (Sicl), Laskara (Sic), Uttargaon (Sic/c)	15,900	26.8
Sub-total		57,900	97.5
Water bodies		1,500	2.5
Grand total		59,400	100.0

Table V.2.7 Soil Profile Description (1/9)

1. Amgaon Series

The Amgaon Series comprises seasonally flooded, poorly drained soils developed in Teesta Alluvium. They are profusely mottled, silty clay loam in the sub-soil with olive grey and olive brown colours. They occur on the older meander floodplain slopes of nearly level to gently undulating ridges, inter ridge depressions and remnants of channels. They occupy about 3,500 ha (5.9%) in the Study area.

Typical profile : Amgaon, medium highland
 Location : Stop no. 78G/9 P/16, Satnarayan, Lalmonirhat
 Topography : Slightly depressed, very gently undulating
 Land use : Aus/Jute - T. Aman - Rabi
 Drainage : Poor, Flooded upto 30-60 cm for 2-3 months in the rainy season
 Taxonomy classification : Aeric Haplaquept

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Olive grey (5Y5/2 moist) with many medium to coarse distinct yellowish brown mottles; <u>Loam</u> ; massive, slightly sticky, slightly plastic, firm moist; many very fine and fine tubular pores; common fine and medium roots; abrupt smooth boundary; pH 5.2
B21	15-38	Olive grey (5Y5/2) and olive brown (2.5Y4/4) moist with common fine and medium distinct yellowish brown mottles; <u>Silty clay loam</u> ; strong coarse prismatic breaks into coarse angular blocky; slightly sticky, slightly plastic, firm moist; continuous thick grey cutans along ped faces; common fine tubular pores; common medium roots; clear smooth boundary; pH 6.3
B22	38-60	Olive brown (2.5Y4/4) moist with many fine and medium distinct dark yellowish brown mottles; <u>Silty clay loam</u> ; moderate coarse prismatic breaks into coarse angular blocky; Slightly sticky, slightly plastic; firm moist; broken grey cutans along ped faces, abrupt smooth boundary; pH 6.4
C	69-110	Light grey (5Y7/1) and olive brown (2.5Y4/4) moist with many fine and many distinct dark brown mottles; <u>Silt loam</u> ; massive; slightly sticky, slightly plastic; firm moist; pH 6.6

2. Bonarpara Series

The Bonarpara Series comprises seasonally shallowly or intermittently flooded, imperfectly or poorly drained soils developed in Teesta Alluvium. They have dark greyish brown, silt loam sub-soil with weak prismatic structure. They occurs on the older floodplain ridges, slopes and occupy about 5,300 ha (8.9%).

Typical profile : Bonarpara, high land
 Location : Stop no. 78G/9 P/9 Mirerbari, Rajarhat
 Topography : Very gently undulating ridges
 Land use : Aus - T. Aman - Rabi
 Drainage : Imperfect, Intermittently flooded upto 30 cm in the rainy season
 Taxonomy classification : Aeric Haplaquept

(to be continued)

Table V.2.7 Soil Profile Description (2/9)

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Olive grey (5Y5/2) moist; with common fine distinct yellowish brown mottles; <u>Loam</u> , massive; slightly sticky, slightly plastic, friable moist, many fine roots; abrupt smooth boundary; pH 5.8
B21	15-36	Dark greyish brown (2.5Y4/2) moist with common fine faint dark yellowish brown mottles; <u>Silt loam</u> ; weak very coarse to coarse prismatic structure; slightly sticky slightly plastic, friable moist; patchy grey cutans along ped faces; few fine pores; few very fine roots; abrupt smooth boundary.; pH 6.8
B22	36-62	Greyish brown (2.5Y4/2) moist with common fine distinct yellowish brown mottles; <u>Silt loam</u> ; massive; friable moist; few fine pores; clear smooth boundary; pH 6.1
C1	62-85	Olive (5Y4/3) and Grey (5Y6/1) moist; <u>Sandy loam</u> ; Single grain; non-sticky, non-plastic; loose moist; clear smooth boundary; pH 6.5
C2	85-115	Olive Grey (5Y5/2) moist; <u>Sandy loam</u> ; single grain; loose moist; pH 6.5

3. Chilmari Series

The Chilmari Series comprises seasonally shallowly or intermittently flooded, imperfectly to poorly drained soils developed in Teesta Alluvium. They are olive, friable, silt loam with moderate prismatic structure in the B-horizon. They occupy about 1,200 ha (2.0%).

Typical profile	: Chilmari, Medium high land
Location	: Stop no. 78G/9 P/14, Tapurchar, Kurigram
Topography	: Very gently undulating Floodplain ridge
Land use	: Aus - T. Aman - Fallow
Drainage	: Poor, flooded upto 30-90 cm in the rainy season
Taxonomy classification	: Aeric Haplaquent

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Olive grey (5Y5/2) moist with common medium distinct dark brown mottles; <u>Silt loam</u> ; massive, slightly sticky, slightly plastic; friable moist; many very fine to fine pores; many fine and medium roots; clear smooth boundary; pH 6.0
B2	15-58	Olive (5Y5/3) moist with few fine to medium distinct olive brown mottles; <u>Silt loam</u> ; weak very coarse and coarse prismatic structure; Slightly sticky, slightly plastic, friable moist. Few fine pores; common fine roots; clear smooth boundary; pH 6.2
C1g	58-75	Olivegrey (5Y5/2) moist with common fine and medium distinct brown mottles; <u>Silt loam</u> ; weak very coarse and coarse prismatic structure; slightly sticky, slightly plastic, friable moist; few fine pores, few fine roots; clear smooth boundary; pH 6.5
C2	75-100	Light olive grey (5Y6/2) moist, <u>Sandy loam</u> , massive; non-sticky, non-plastic, friable moist; pH 6.6

(to be continued)

Table V.2.7 Soil Profile Description (3/9)

4. Farabari Series

The Farabari Series comprises seasonally flooded, poorly drained, dark greyish brown, silty clay loam, soils developed in older Teesta alluvium. They have moderate to strong angular blocky structure in the B-horizon and have grey coating. They occur in the older floodplain basin area. They occupy about 6,400 ha (10.8%).

Typical profile : Farabari, medium highland
 Location : Stop no. 78G/5 P/12, Dhananjoy, Lalmonirhat
 Topography : Nearly level flat land
 Land use : Boro - T. Aman - Fallow
 Drainage : Poor - Flooded upto 30-90 cm in the rainy season
 Taxonomy classification : Aeric Haplaquept

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Olive grey (5Y5/2) moist with common fine distinct yellowish brown mottles; <u>Silty clay loam</u> ; massive, slightly sticky; slightly plastic, firm moist; many very fine to fine pores; common very fine to fine roots; abrupt smooth boundary; pH 6.0
B21g	15-48	Dark greyish brown (10YR4/2) moist with common fine distinct dark yellowish brown mottles; <u>Silty clay loam</u> ; strong coarse angular blocky structure; continuous thick grey cutans on ped faces; sticky, slightly plastic; firm moist; common very fine tubular pores; common fine roots; clear smooth boundary; pH 6.8
B22	48-70	Greyish brown (2.54/2) moist with common fine to medium distinct dark yellowish brown mottles; <u>silty clay loam</u> ; moderate coarse angular blocky structure, patchy grey cutans along ped faces; sticky, slightly plastic, firm moist; abrupt smooth boundary; pH 6.8
C1	70-100	Olive grey (5Y5/2) moist with common fine distinct yellowish brown mottles; <u>Silty clay loam</u> ; massive, slightly sticky, slightly plastic, friable moist; abrupt smooth boundary; pH 7.0
C2	100-125	Olive brown (2.5Y4/4) moist, <u>Silt loam</u> ; massive, slightly sticky, slightly plastic, friable moist; pH 7.0

5. Gangachara Series

The Gangachara Series comprises seasonally shallowly to intermittently flooded. They are imperfectly to poorly drained soils developed in Teesta alluvium. They are olive grey or grey Silt loam sub-soil with yellowish brown mottles and moderate structure. They occur on younger and older floodplain ridges and medium highland. They occupy about 11,800 ha (19.9%).

Typical profile : Gangachara, medium high land
 Location : Stop no. 78G/10 P/I, Satbhita, Ulipur
 Topography : Middle slopes of gently undulating flat land
 Land use : Boro (HYV) - T. Aman (HYV/L) - Fallow
 Drainage : Poor to imperfect
 Taxonomy classification : Typic Haplaquept

(to be continued)

Table V.2.7 Soil Profile Description (4/9)

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
AP1g	0-15	Grey (5Y5/1) moist with common fine distinct yellowish brown mottles; <u>Silt loam</u> ; massive, slightly plastic, slightly sticky, friable moist; many very fine to fine tubular pores; many very fine to fine roots; abrupt smooth boundary; pH 6.4
B21	15-36	Olive grey (5Y5/2) moist with few fine distinct yellowish brown mottles, <u>Silt loam</u> ; moderate coarse angular blocky structure; slightly sticky, slightly plastic friable moist; many fine tubular pores; few fine roots; abrupt smooth boundary; pH 6.5
B22	36-70	Olive grey (5Y5/2) moist with many fine distinct yellowish brown mottles, <u>Silt loam</u> ; moderate coarse angular blocky structure, slightly plastic, slightly sticky, friable moist, grey cutans along ped faces; many fine tubular pores; few fine roots; abrupt smooth boundary; pH 6.8
C1	70-90	Greyish brown (2.5Y5/2) moist, <u>Silt loam</u> ; Weak coarse prismatic structure; slightly plastic, slightly sticky, friable moist; common fine tubular pores; abrupt smooth boundary; pH 7.0
C2	90-120	Olive (5Y5/3) moist, with common fine distinct yellowish brown mottles, <u>Sandy loam</u> ; very coarse prismatic structure; slightly sticky, slightly plastic, friable moist, many fine tubular pores; pH 7.0

6. Kaunia Series

The Kaunia Series comprises seasonally shallowly flooded, poorly drained soils developed in Teesta alluvium. They are grey to live grey, mottled, yellowish brown, silty clay loam with moderate to strong angular blocky structure and grey cutans in the B-horizon. They occur in the older floodplain medium highland and basin. They occupy about 13,300 ha (21.9%).

Typical profile	: Kaunia, medium highland
Location	: Stop no. 78G/9 P/2, Bancharampur, Kurigram
Topography	: Nearby level basin
Land use	: Boro - T. Aman - Fallow
Drainage	: Poor - Flooded upto 60-90 cm in the rainy season
Taxonomy classification	: Typic Haplaquept

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-13	Grey (5Y5/1) moist with common fine distinct yellowish brown mottles; <u>Silty clay loams</u> ; massive; slightly sticky, slightly plastic, firm moist; many fine to medium tubular pores; many fine to medium roots; abrupt smooth boundary; pH 6.2
B21g	13-34	Grey (5Y5/1) moist with common fine distinct yellowish brown mottles; <u>Silty clay loam</u> ; moderate to strong coarse angular blocky structure; continuous thicken grey cutans along ped faces; sticky plastic, firm moist; few fine tubular pores; common very fine roots; abrupt smooth boundary; pH 6.6

(to be continued)

Table V.2.7 Soil Profile Description (5/9)

B22	34-60	Grey (5Y5/1) moist with common distinct dark yellowish brown mottles; <u>Silty clay loam</u> ; weak coarse angular blocky structure; sticky, plastic firm moist; thin grey cutans along ped faces and cracks; common fine tubular pores; few fine roots; abrupt smooth boundary; pH 7.0
C1	60-90	Olive grey (5Y5/4) moist with fine distinct yellowish brown mottles; <u>Silty clay loam</u> ; massive; slightly sticky, slightly plastic, firm moist; few iron manganese concretions; abrupt smooth boundary, pH 7.0
A1b	90-110	Dark greyish brown (10YR4/2) moist with common fine dark yellowish brown mottles; <u>Silty clay</u> ; massive; many very fine and tubular pores; pH 6.8

7. Laskara Series

The Laskara Series comprises seasonally flooded, poorly drained soils developed in the older Teesta alluvium. They are dark grey, silty clay loam with moderate to strong angular blocky structure and thick dark grey coating in the B-horizon. They occur in the basin and basin centre and occupy about 1,300 ha (2.9%).

Typical profile	: Laskara, medium lowland
Location	: Stop no. 78G/9 P/15, Chandimari, Rajarhat
Topography	: Very gently sloping basin
Land use	: T. Aman - Boro (HYV)
Drainage	: Poor - Flooded upto 100 -150 cm for 4-5 months
Taxonomy classification	: Typic Haplaquept

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Very dark greyish brown (2.5Y3/2) moist with common fine light olive brown mottles; <u>Silty clay loam</u> ; massive; sticky, plastic, firm moist many fine tubular pores; common fine roots; abrupt smooth boundary, pH 6.1
B21g	15-32	Dark grey (5Y4/1) moist with many distinct yellowish brown mottles; <u>Silty clay</u> ; strong coarse and medium angular blocky, very sticky, very plastic, very firm moist; thick and dark grey cutans along ped faces; common fine tubular pores; common fine roots, abrupt smooth boundary; pH 6.3
B22g	32-55	Dark grey (5Y4/1) moist with few fine yellowish brown mottles; <u>Silty clay</u> ; strong coarse and medium angular blocky structure; sticky, plastic, firm moist; thick dark grey cutans along ped faces and cracks; common fine tubular pores; few fine roots; clear smooth boundary; pH 7.0
C1	55-100	Light olive brown (2.5Y5/4) moist with many fine distinct yellowish brown mottles; <u>Silty clay</u> ; sticky plastic, firm moist, patchy thick grey cutan along ped faces; few iron manganese concretions; clear smooth boundary; pH 7.0
A1b	100-120	Dark greyish brown (10YR4/2) moist with few fine faint dark brown mottles, <u>silty clay</u> , firm moist; pH 7.0

(to be continued)

Table V.2.7 Soil Profile Description (6/9)

8. Parasbari Series

The Parasbari Series comprises non-flooded or seasonally intermittently flooded, moderately well to imperfectly drained soils developed in Teesta alluvium. They are olive brown, silt loam mottled yellowish brown B-horizon. They have moderate structure development. They occur on summits and upper slopes of gently undulating ridges and occupy about 5,900 ha (9.9%).

Typical profile	: Palasbari, highland
Location	: Stop no. 78g/9 P/4, Mirerbari, Kurigram
Topography	: Nearly level ridge
Land use	: Aus - T. Aman - Rabi
Drainage	: Moderately well drained
Taxonomy classification	: Aquic Dystrochrept

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
AP	0-15	Dark brown (10YR4/3) moist with common fine distinct dark yellowish brown mottles; <u>Silt loam</u> ; massive, slightly sticky, slightly plastic, friable moist; common very fine tubular pores; common fine to medium roots; abrupt smooth boundary, pH 5.8
B21	15-40	Olive brown (2.5Y4/4) moist with common fine greyish brown mottles; <u>Silt loam</u> , weak coarse prismatic structure; slightly sticky, slightly plastic, friable moist; common fine tubular pores; few very fine and fine roots; abrupt smooth boundary; pH 6.2
B22	49-75	Olive brown (2.5Y4/4) moist with few fine distinct yellowish brown and grey mottles; <u>Silt loam</u> ; massive, friable moist; common fine tubular pores; few very fine to fine roots; abrupt smooth boundary, pH 6.5
C1	75-100	Greyish brown (2.5Y5/2) moist with common fine to medium distinct yellowish brown mottles; <u>Silt loam</u> ; massive, friable moist, common fine tubular pores; slightly stratified; abrupt smooth boundary, pH 6.5
C2	100-120	Light olive brown (2.5Y5/4) moist with fine distinct grey mottles; <u>Silt loam</u> ; massive, friable moist; many tubular pores, pH (7.0)

9. Pirgacha Series

The Pirgacha Series comprises moderately well drained dark brown silt loam soils developed in the higher ridges of old Teesta meander floodplain. They have weak structural development and occupy about 4.00 ha (6.7%).

Typical profile	: Pirgacha, High land
Location	: Stop no. 78G/9, P/5, Sibram, Rajarhat
Topography	: Nearly level ridge
Land use	: Aus/Jute - Rabi
Drainage	: Moderately well drained, above normal flood level
Taxonomy classification	: Typic Dystrochrept

(to be continued)

Table V.2.7 Soil Profile Description (7/9)

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
AP	0-13	Dark brown (10YR4/3) moist, <u>Silt loam</u> ; massive slightly sticky, slightly plastic, friable moist, may fine tubular pores; common fine roots; abrupt smooth boundary; pH 5.6
B21	1113-47	Dark brown (10YR4/3) moist; <u>Silt loam</u> ; weak coarse prismatic structure; non-sticky, non-plastic, friable moist; many very fine tubular pores, few very fine and medium roots; abrupt smooth boundary, pH 5.9
B22	47-80	Dark brown (10YR4/3) moist; <u>Silt loam</u> ; weak coarse prismatic structure; non-sticky, non-plastic, friable moist; common very fine tubular pores; few fine to medium roots; abrupt wavy boundary ; pH 6.0
C1	80-100	Olive (5Y5/3) moist; <u>Silt loam</u> ; massive, non-sticky, non-plastic, friable moist; common fine tubular pores; few very fine roots, abrupt wavy boundary; pH (6.5)
C2	100-120	Light grey (5Y7/2) moist with common fine to medium distinct dark brown mottles; <u>Sandy loam</u> ; friable moist; pH (6.8)

10. Uttargaon Series

The Uttargaon Series comprises seasonally shallowly or moderately deeply flooded; poorly drained soils developed in old Teesta alluvium. They have very dark greyish brown, silty clay or clay B-horizon with strong angular block structure and thick dark grey cutans along ped faces. They generally occur on the older floodplain basins and basin centres and occupy about 2,500 ha (4.2%)

Typical profile	: Uttargaon, medium low land
Location	: Stop no. 78G/9P/8; Harisher Taluk; Rajarhat
Topography	: Nearly level basin
Land use	: T. Aman - Boro
Drainage	: Poor Flooded upto 90-180 cm in rainy season
Taxonomy classification	: Aeric Haplaquept

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Dark grey (5Y4/1) moist with common fine distinct yellowish brown mottles; <u>Silty clay loam</u> ; massive; slightly sticky, slightly plastic, firm moist; few very fine tubular pores; many fine roots; abrupt smooth boundary; pH 6.3
B1g	15-40	Very dark greyish brown (2.5Y3/2) moist with common distinct yellowish brown mottles, <u>Silty clay</u> ; strong coarse angular blocky structure; sticky, plastic, very firm moist; continuous thick grey cutans along ped faces and cracks; common very fine tubular pores; few very fine roots; clear smooth boundary; pH 6.9
B22	40-65	Greyish brown (2.5Y5/2) moist with common distinct yellowish brown mottles; <u>Silty clay</u> ; moderate coarse angular blocky structure; sticky, plastic, very firm moist; thick dark grey cutans along ped faces; few fine tubular pores; clear smooth boundary; pH 7.0

(to be continued)

Table V.2.7 Soil Profile Description (8/9)

C1	65-80	Greyish brown (2.5Y5/2) moist with many fine distinct dark brown mottles; <u>Silty clay loam</u> ; moderate coarse angular blocky structure; thick grey cutans along ped faces; many fine tubular pores; clear smooth boundary; pH 7.3
C2g	80-110	Dark grey (5Y4/1) moist many with fine distinct yellowish brown mottles; <u>Silty clay loam</u> ; moderate coarse prismatic structure; slightly sticky, slightly plastic, firm moist; common fine tubular pores; pH (7.4)

11. Ulipur Series

The Ulipur Series comprises seasonally shallowly to moderately deeply flooded, poorly drained, olive grey mottled yellowish brown silty clay to clay soils, developed in Teesta alluvium. They have strong angular blocky structure in the B-horizon with thick grey cutans. They occur in basin and basin centres and occupy about 1,100 ha (1.9%).

Typical profile	: Ulipur, medium low land
Location	: Stop no. 78/G 10 P/18, Chilmari
Topography	: Very gently sloping basin
Land use	: T. Aman - Boro
Drainage	: Poor, Flooded upto 90-120 cm in rainy season for 4-5 months
Taxonomy classification	: Aeric Haplaquept

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Olive grey (5Y4/2) moist with common fine to medium distinct dark yellowish brown mottles; <u>Silty clay loam</u> ; massive slightly sticky, slightly plastic, firm moist; few medium tubular pores; many fine to medium roots, clear smooth boundary; pH 6.0
B21g	15-50	Olive grey (5Y4/2) moist with many fine to medium distinct dark yellowish brown mottles; <u>Silty clay</u> ; coarse angular blocky structure; sticky; plastic firm moist; patchy grey cutans on ped faces and cracks; common fine to medium tubular pores, few very fine roots; abrupt smooth boundary; pH 6.5
B22	50-75	Olive (5Y5/6) moist with common prominent dark yellowish brown mottles; <u>Silty clay</u> ; coarse angular blocky; sticky structure, plastic, firm moist; patchy grey cutans along ped faces; common fine to medium tubular pores, abrupt smooth boundary, pH 6.8
C1	75-120	Dark greyish brown (10YR4/4) moist with common olive grey mottles; <u>Silty clay</u> ; massive; sticky, plastic, firm moist; pH 7.0

12. Sandy Alluvium

The Sandy Alluvium is a miscellaneous land types occurring on the active and young floodplain of Teesta and Dharla rivers. It comprises seasonally flooded, poorly drained, grey, stratified, sandy alluvium.

Typical profile	: Sandy alluvium, medium high land
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(to be continued)

Table V.2.7 Soil Profile Description (9/9)

Location	:	Stop no. 78G/10 P/18; Pusla Bajra, Chilmari
Topography	:	Very gently undulating charland
Land use	:	Grasses
Drainage	:	Poor, flooded upto 90-180 cm for 4-5 months
Taxonomy classification	:	Typic Psamaquent

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
C1	0-15	Grey (5Y6/1) moist, <u>Sand</u> ; single grain loose moist, common fine roots; abrupt smooth boundary; pH 8.0
C2	15-50	Light brownish grey (2.5Y6/2) moist; <u>Loamy sand</u> ; very friable, moist, stratified; abrupt smooth boundary, pH 8.0
C3	50-60	Olive grey (5Y5/2) moist, <u>Silt loam</u> ; massive, stratified; friable moist, abrupt smooth boundary; pH 8.0
C4	60-100	Light brownish grey (2.5Y6/2) moist, <u>loamy sand</u> , massive, pH 8.0

13. Silty Alluvium

The Silty Alluvium is a miscellaneous land type occurring on the active young floodplain. It comprises seasonally flooded, poorly drained, grey, stratified, medium to moderately fine textural alluvium. The sandy alluvium and silty alluvium complexes cover about 1,500 ha (2.5%) of the total Study area.

Typical profile	:	Silt loam, medium highland
Location	:	Stop no. 78G/9 P/17; Charkalua; Lalmonirhat
Topography	:	Very gently undulating charland
Land use	:	Aus - Rabi (locally)
Drainage	:	Poor, flooded upto 90-180 cm for 5-6 months
Taxonomy classification	:	Typic Fluvaquent

<u>Horizon</u>	<u>Depth (cm)</u>	<u>Description</u>
APg	0-15	Grey (5Y6/1) moist with common distinct yellowish brown mottles; <u>Silty clay loam</u> ; massive, slightly sticky, slightly plastic, friable moist; few very fine tubular pores; few very fine roots, abrupt smooth boundary; pH 7.5
C1g	15-35	Grey (5Y5/1) moist, with few fine dark brown mottles; <u>silt loam</u> ; stratified; friable moist; fine tubular pores; few very fine roots; abrupt smooth boundary; pH 8.0
C2	35-60	Greyish brown (2.5Y5/2) moist; with few fine yellowish brown mottles; <u>silt loam</u> ; massive, stratified; slightly sticky, slightly plastic, firm moist; few fine tubular pores; abrupt smooth boundary; pH 8.0
C3	60-100	Olive grey (5Y5/2) moist; <u>silt loam</u> ; massive, friable moist; pH 8.0

Table V.4.1 Analytical Method

Analytical Item	Method
A. Chemical Analysis	
Total Nitrogen (TN) content	Semimicro Kjeldahl method using a Selenium/Copper Catalysis.
Organic Matter (OM) content	Wet-Oxidation based on Walkey - Black's Rapid titration method.
Soil Reaction (pH)	Glass electrode method after soil saturation extract (1:5) using Beckman - Zerometric pH meter with glass electrode.
Electrical Conductivity (EC)	Soil saturation extract (1:5) using a Solu-bridge. The results are expressed in milli simens/cm at 25 °C multiplied by factor of the ratio.
Cation Exchange Capacity (CEC)	BaCl ₂ -TEA and EDTA method. After saturation with BaCl ₂ -TEA and are washing with water, the soil was shaken with known amount of MgSO ₄ and centrifuged. The remaining Mg-in an aliquot of the supernatant liquid was titrated with EDTA using eriochrome black-T indicator and subtracted from blank determination for calculation of CEC.
Exchangeable Cations (Ca, Mg, Na, K)	Exch. Ca, Mg were determined by NH ₄ ⁺ -Ac (pH 7.0) extraction method by titration with EDTA and indicators. Exch. Na, K were determined by NH ₄ ⁺ -Ac (pH 7.0) extraction method by flame photometer.
Extractable Cations (Ca, Mg, Na, K)	NH ₄ -Ac extraction method
Available Phosphorans (p)	Olsen (0.5 N Na HCO ₃ at pH 8.5) method
Available Zinc (Zn)	Colorimetrically by Dithizone method.
Available Potash (K)	Morgan's method using reagent containing Sod. Acetate and acetic acid.
Available Ammania (NH ₄)	Colorimetric method.
B. Physical Analysis	
Soil Texture (Particle Size Distribution)	Bouyocos Hydrometer method and classified in the USDA system triangle textural chart.
Bulk Density (BD)	Core sampling method. Direct oven drying of 100 c.c. of soil core.
Water Holdding Capacity (WHC)	Gravimetric method & water saturation for 24 hours.

Table V.4.2 Chemical Properties of Soils

Soil series	Sample No.	Depth (cm)	Organic matter %	Total nitrogen %	pH	ECX X10 ³ mg/cm	CEC me/100g	Exchangeable cations (me/100g)						Extractable cations (me/100g)						Available nutrients (PPN)			
								Na	K	Ca	Mg	Na	K	Ca	Mg	Na	K	Ca	Mg	P	Zn	K	NH ₄
1. Amgaon	P16/1	0-15	1.76	0.10	5.2	0.1	11.45	0.38	0.24	1.30	0.86	0.61	0.26	1.50	1.03	5.1	3.0	60	32.4				
	P16/2	0-38	1.10	0.08	6.3	0.1	12.40	0.26	0.28	1.32	0.72	0.78	0.36	1.92	1.03	4.8	22.2	90	162.0				
	P16/3	0-60	0.78	0.04	6.4	0.1	10.49	0.19	0.10	0.92	0.27	0.35	0.10	0.90	0.30	20.1	20.1	22	32.4				
2. Bonarpara	P9/1	0-15	1.36	0.07	5.8	0.1	11.93	0.28	0.29	0.72	0.33	0.39	0.31	0.75	0.36	11.5	5.5	70	25.2				
	P9/2	0-36	0.92	0.06	6.0	0.1	11.93	0.23	0.14	0.58	0.19	0.34	0.15	0.62	0.22	5.8	2.5	25	32.4				
	P9/3	0-62	0.38	0.02	6.1	0.1	8.59	0.17	0.12	0.34	0.13	0.26	0.13	0.37	0.16	6.6	3.5	18	32.3				
3. Chilmani	P14/1	0-15	1.38	0.09	6.0	0.1	10.21	0.32	0.24	4.04	1.78	0.43	0.25	4.17	1.95	5.6	3.2	75	16.2				
	P14/2	0-58	0.58	0.04	6.2	0.1	8.59	0.17	0.16	3.94	1.88	0.30	0.18	4.09	2.07	5.0	2.2	80	32.4				
	P14/3	0-75	0.60	0.04	6.5	0.1	8.11	0.11	0.30	4.72	1.48	0.34	0.31	5.01	1.69	5.6	1.2	100	19.8				
4. Farabari	P12/1	0-15	2.19	0.16	6.0	0.1	11.93	1.21	0.64	3.57	1.31	2.00	0.72	4.09	1.60	6.6	22.0	160	113.4				
	P12/2	0-48	1.07	0.09	6.8	0.1	17.17	0.62	0.32	3.29	1.27	1.22	0.36	4.17	1.59	7.6	10.7	70	113.4				
	P12/3	0-70	1.15	0.06	6.8	0.1	12.88	0.56	0.29	3.89	0.82	0.78	0.31	3.59	1.01	5.6	5.5	80	3.4				
5. Gangachara	P1/1	0-15	1.52	0.11	6.4	0.1	10.83	0.48	0.20	3.31	1.33	0.69	0.21	3.55	1.59	5.4	6.3	60	32.4				
	P1/2	0-36	0.76	0.03	6.5	0.1	11.57	0.50	0.09	3.82	1.27	0.61	0.10	3.84	1.30	4.9	2.7	22	25.2				
	P1/3	0-70	0.24	0.04	6.8	0.1	14.31	0.65	0.25	4.06	1.77	0.87	0.26	5.01	2.08	5.7	6.4	61	41.4				
6. Kaunia	P2/1	0-13	1.60	0.08	6.2	0.1	10.30	0.46	0.17	3.47	1.39	0.69	0.18	3.59	1.56	7.2	4.5	45	32.4				
	P2/2	0-34	0.62	0.06	6.6	0.1	13.85	0.46	0.25	4.44	2.02	0.65	0.26	4.59	2.21	5.4	4.2	61	32.4				
	P2/3	0-60	0.49	0.02	7.0	0.1	8.82	0.40	0.50	4.15	1.65	0.52	0.05	4.17	1.05	6.1	4.5	22	8.8				
7. Laskara	P15/1	0-15	2.10	0.13	6.1	0.1	12.88	0.55	0.28	3.67	0.96	0.78	0.31	3.92	1.17	5.2	5.7	60	48.6				
	P15/2	0-32	2.08	0.12	6.3	0.1	14.79	0.37	0.20	4.14	1.14	0.52	0.21	4.17	1.17	5.0	5.3	42	9.0				
	P15/3	0-55	1.53	0.06	7.0	0.1	16.70	0.55	0.29	4.69	1.32	0.78	0.31	5.10	1.56	6.3	5.3	80	57.6				
8. Palashbari	P4/1	0-15	1.32	0.09	5.8	0.1	11.93	0.36	0.26	0.82	0.33	0.52	0.31	1.04	0.52	12.0	4.2	82	81.0				
	P4/2	0-40	0.87	0.06	6.2	0.1	11.45	0.68	0.31	0.94	0.55	0.78	0.31	0.96	0.58	6.3	8.2	80	32.4				
	P4/3	0-75	0.47	0.03	6.5	0.1	8.50	0.58	0.14	0.89	0.26	0.78	0.15	1.08	0.43	6.0	8.1	26	25.2				
9. Pirgacha	P5/1	0-13	1.16	0.08	5.6	0.1	11.45	0.18	0.33	0.66	0.23	0.26	0.36	0.71	0.26	6.7	2.9	80	16.2				
	P5/2	0-47	1.01	0.07	5.9	0.1	12.40	0.22	0.30	0.70	0.18	0.30	0.31	0.75	0.21	5.6	7.2	60	16.2				
	P5/3	0-80	0.32	0.02	6.0	0.1	7.63	0.21	0.04	0.38	0.11	0.30	0.05	0.41	0.14	5.8	1.4	20	25.2				
10. Uttargaon	P8/1	0-15	1.89	0.08	6.3	0.1	13.36	0.61	0.19	4.85	1.68	1.40	0.20	5.01	1.82	5.7	9.1	45	48.6				
	P8/2	0-40	1.30	0.08	6.9	0.1	13.83	0.17	0.14	5.32	1.53	1.00	0.15	5.34	1.56	5.2	3.5	40	9.0				
	P8/3	0-65	0.90	0.04	7.0	0.1	12.88	0.48	0.14	0.31	2.18	0.56	0.15	0.34	2.21	15.1	6.2	40	25.2				

Table V.4.3 Physical Properties of Soils

Soil series	Sample No.	Depth (cm)	Mechanical Analysis			Textural class USDA	Bulk density (g/cc)	Moisture content %	Water Capacity %
			Sand %	Silt %	Clay %				
1. Amgaon	P16/1	0-15	35	41	24	Loam	1.40	32.7	56.51
	P16/2	-38	16	54	30	Silty clay loam	1.55	20.4	49.71
	P16/3	-60	19	46	35	Silty clay loam	1.35	26.6	55.54
2. Bonarpara	P9/1	0-15	32	42	26	Loam	1.26	21.3	54.24
	P9/2	0-36	26	56	18	Silt loam	1.28	30.2	55.68
	P9/3	0-62	24	64	12	Silt loam	1.20	34.9	60.43
3. Chilmari	P14/1	0-15	13	78	9	Silt loam	1.30	41.9	55.12
	P14/2	0-58	15	72	13	Silt loam	1.32	32.3	52.01
	P14/3	0-75	14	71	15	Silt loam	1.28	34.9	51.36
4. Farabari	P12/1	0-15	10	53	37	Silty clay loam	1.35	30.0	57.02
	P12/2	0-48	14	54	32	Silty clay loam	1.43	26.1	50.75
	P12/3	0-70	11	57	32	Silty clay loam	1.30	26.2	53.65
5. Gangachara	P1/1	0-15	8	68	24	Silt loam	1.34	26.5	56.81
	P1/2	0-36	9	65	26	Silt loam	1.48	25.5	48.80
	P1/3	0-70	7	76	17	Silt loam	1.26	22.4	45.20
6. Kaunia	P2/1	0-13	18	53	29	Silty clay loam	1.22	21.2	50.24
	P2/2	0-34	10	54	36	Silty clay loam	1.41	11.8	47.30
	P2/3	0-60	11	53	35	Silty clay loam	1.32	25.8	48.46
7. Laskara	P15/1	0-15	12	56	32	Silty clay loam	1.38	25.0	51.14
	P15/2	0-32	11	47	42	Silty clay	1.42	27.1	54.54
	P15/3	0-55	9	46	45	Silty clay	1.41	33.8	52.66
8. Palashbari	P4/1	0-15	28	54	18	Silty loam	1.18	19.1	46.50
	P4/2	0-40	27	55	20	Silty loam	1.26	28.1	46.30
	P4/3	0-75	28	60	12	Silt loam	1.15	32.9	53.87
9. Pirgacha	P5/1	0-13	18	62	20	Silt loam	1.18	23.1	54.46
	P5/2	0-47	22	57	21	Silt loam	-	27.4	46.98
	P5/3	0-80	20	68	12	Silt loam	1.16	17.9	52.65
10. Uttargaon	P8/1	0-15	26	42	32	Silty clay loam	1.40	23.8	48.42
	P8/2	0-40	7	45	48	Silty clay	1.45	27.8	51.80
	P8/3	0-65	6	41	53	Silty clay	1.34	25.4	48.65

Table V.5.1 Land Qualities/Characteristics of Soil Mapping Units

Soil map code	Soil Series	Δ Land type	Slope	Texture	Permeability	Drainage	Effective depth	Top soil consisting	Reaction Soil
1	Amgaon	MH-ML	Irregular	SiCl	Moderate	Poor	Deep	Firm	Neutral to Mod.acid
2	Banarpara	H-MH	Irregular	Sil	Moderate	Imperfect	Deep	Firable	Neutral to Mod.acid
3	Chilmari	H-MH	Irregular	Sil	Moderate	Poor	Deep	Friable	Neutral to Mod.acid
4	Farabari	MH-ML	Level	SiCL	Moderate	Poor	Deep	Firm	Neutral
5	Gangachara	H-MH	Irregular	Sil	Rapid to Moderate	Poor/Imperfect	Deep	Friable	Neutral
6	Kauria	MH-ML	Level	SiCL	Moderate	Poor	Deep	Firm	Neutral
7	Laskara	MH-ML	Level	Sic	Slow	Poor	Deep	Firm	Neutral to Mod.acid
8	Palasbari	H-MH	Level	SiL	Rapid	Mod.well	Deep	friable	Neutral to Mod.acid
9	Pirgacha	H	Level	Sil	Rapid	Mod.well	Deep	friable	Neutral to Mod.acid
10	Uttargaon	ML	Level	Sic	Slow	Poor	Deep	firm	Neutral
11	Ulipur	MH-ML	Level	Sic	Slow	Poor	Deep	firm	Neutral
12	Silty alluvium & Sandy alluvium	HM-ML	Irregular	Sil-sand	Rapid/Moderate	Poor to Imperfect	Deep	friable	Neutral

Note Δ: H:Highland, MH:Medium Highland, ML:Medium Lowland.

Table V.5.2 Crop Requirement (1/2)

Crops	Suitability class	Land type	Slope	Drainage	Permeability	Texture	Effective depth (rooting depth)	Top Soil Consistency	Soil Soil Reaction
1 T.AUS (HYV)	S1	H/MH	Level	Poor	Slow	CL/C	Deep/Mod deep	Firm	Men/modalk
	S2	MH	Irr/gatly sloping	Imperfect	Mod	L/C	Shallow	Friable/V.firm	Mod AC/alkaline
	S3	ML	Roll/Sloping	Mod well	-	SL	V.shallow	V.friable	High acid
	N	L-VL	Highly/Mods teep	Well	Rapid	S	V.Shallow	Loose	High alkaline
2 T. Aman (HYV)	S1	H/MH	Level	Poor	Slow	CL-C	Deep	Firm	Men/modalk
	S2	MH	Irr	imperfch/VP	Mod	L	Med deep	Friable/V.firm	Mod AC/modalk
	S3	ML	Roll/Sloping	Mod well	Mod	SL	Shallow	V.Friable	High acid
	N	L-VL	Hilly/Mod steep	Well	Rapid	S	V.shallow	Loose	High alkaline
3 Boro (HYV)	S1	H/MH	Level	P-V.P	Slow	C-CL	Deep/Mod deep	Firm	Neutral
	S2	MH	Level/Irr	Imperfect	Slow	L	Mod	Friable/V.firm	Mod acid/alkline
	S3	ML	Irr	Mod well	Mod	SL	Shallow	V.Friable	High acid
	N	L-VL	Hilly/Mod steep	Well	Rapid	S	V.Shallow	Loose	High alkaline
4 Jute (HYV)	S1	H/MH	Level	Well/Mrwwds	Mod	S/CL	Deep	Friable/V.firm	Neutral
	S2	MH	Irr	Mod well	Rapid	SL	Mod deep	Firm	Medalk
	S3	ML	Roll	Imperfect	Slow	C	Shallow	Ve.firm	Mod acid
	N	L-VL	Hilly	Poor V.poor	Slow	S	V.Shallow	Loose	High acid/H.alkale
5 Wheat/Maize	S1	H/MH	Lev	Well	Mod	L	Deep	Friable/V.friable	Neutral
	S2	ML	Irr/gatly sloping	Mod Well	Rapid	CL	Mod deep	Firm	Mod acid/Medi dk
	S3	L	Roll/sloping	Imperfect	Slow	C/CL	Shallow	V.Firm	High acid
	N	V-L	High/Modsteep	Poor-V.poor	Slow	S	V.Shallow	Loose	High alkaline

Table V.5.2 Crop Requirement (2/2)

Crops	Suitability class	Land type	Slope	Drainage	Permeability	Texture	Effective depth (rootingdepth)	Top-soil Consistency	Soil Reaction
6 Sugarcane	S1	H/MH	Lev	Well-Mod well	Mod	L/CL	Deep	Friable	Neutral/Med dk
	S2	ML	Irr/G. stop	Imperfect	Rapid	C	Mod deep	Frim	Mod acid/Alkaline
	S3	ML	Roll/Si	Poor	Slow	SL	Shallow	V.Frim	High acid
	N	L-VL	Hilly/Mod sleep	Poor	Slow	S	S.Shallow	Loose	High alk
7 Potato	S1	H/MH	Level	Well/Imp	Mod	L	Deep	Friable/V.friable	Neutral
	S2	ML	Irr	Poor	Rapid	SL/CL	Mod deep	Firm	Mod acid/alk
	S3	ML	Roll	-	Slow	C	Shallow	Firm	High acid
	N	L-VL	Hilly	V.poor	-	S	S.Shallow	V.Frim/Loose	High acid
8 Mustard	S1	H/MH	Level	Well	Mod	L-Cl	Deep	Friable	Neutral
	S2	ML	Irr/of.sloping	Mod well	Rapid	SL	Mod deep	V.Frim	Mod acid/acid alk
	S3	L	Roll/sloping	Imperfect	Slow	C	Shallow	Firm	High acid
	N	VL	Hilly/Mod sleep	poor to v.poor	-	S	S.Shallow	"V.firm, Loose"	High alk
9 Groundnut	S1	H/MH	Level	Well	Mod	L/SL	Deep	Friable/V.friable	Neutral
	S2	ML	Irr	Mod.well	Rapid	CL	Mod deep	Firm	Mod acid/acid alk
	S3	L	Roll	Imperfect	Slow	S	Shallow	Loose	High acid
	N	VL	Hilly	Poor/Poor	-	C	S.Shallow	V.Frim	High alk
10 Orchard	S1	H	Level	Well/Mod well	Mod	L/CL	Deep	Friable	Neutral
	S2	MH	Irr	Imp.	Rapid	C	Mod deep	Frim	Mod acid/Mod alk
	S3	-	Roll	Poor	Slow	SL	Shallow	-	High acid
	N	V-VL	Highly	Poor	-	S	S.Shallow	V.Frim	High alk

Table V.5.3 Land Suitability Mapping Units

Mapping Unit	Land Suitability Classes			Component of Soil Units
	Highly Suitable (S1)	Moderately Suitable (S2)	Marginal Suitable (S3)	
1	Orchard Aus T.Aman (HYV) Jute (HYV) Wheat/Maize Sugarcane Ground nut Oil seed Potato	T. Aus (HYV) Boro (HYV) Tobacco	-	2a, 3a, 5a
2	Orchard Aus Jute (HYV) Sugarcane Wheat/Maize Oil seed	T.Aus (HYV) T.Aman (HYV) Ground nut Potato	Boro (HYV)	8a, 8b, 9a
3	T.Aus (HYV) T.Aman (HYV) Aus Jute (HYV) Wheat/Maize Potato	Sugarcane Boro (HYV) Ground nut Oil seed	Tobacco	2b, 3b, 5b
4	Boro (HYV) T.Aus (HYV) T.Aman (HYV) Jute (HYV)	Aus Wheat/Maize Potato Oil Seed	Sugar cane Ground nut	1b, 4b, 6b, 7b, 11b,
5	Boro (HYV) B.Aman (DW)	Aus Jute(HYV) T.Aman (HYV)	Wheat/Maize Ground nut Oil Seed	1c, 4c, 6c, 7c, 10c, 11c
6	B. Aman (DW)	T. Aus (LIV) Ground nut Potato Jute.(HYV)	B.Amon (DW) Sugar cane Oil Seed Wheat/Maize	12b, 12c

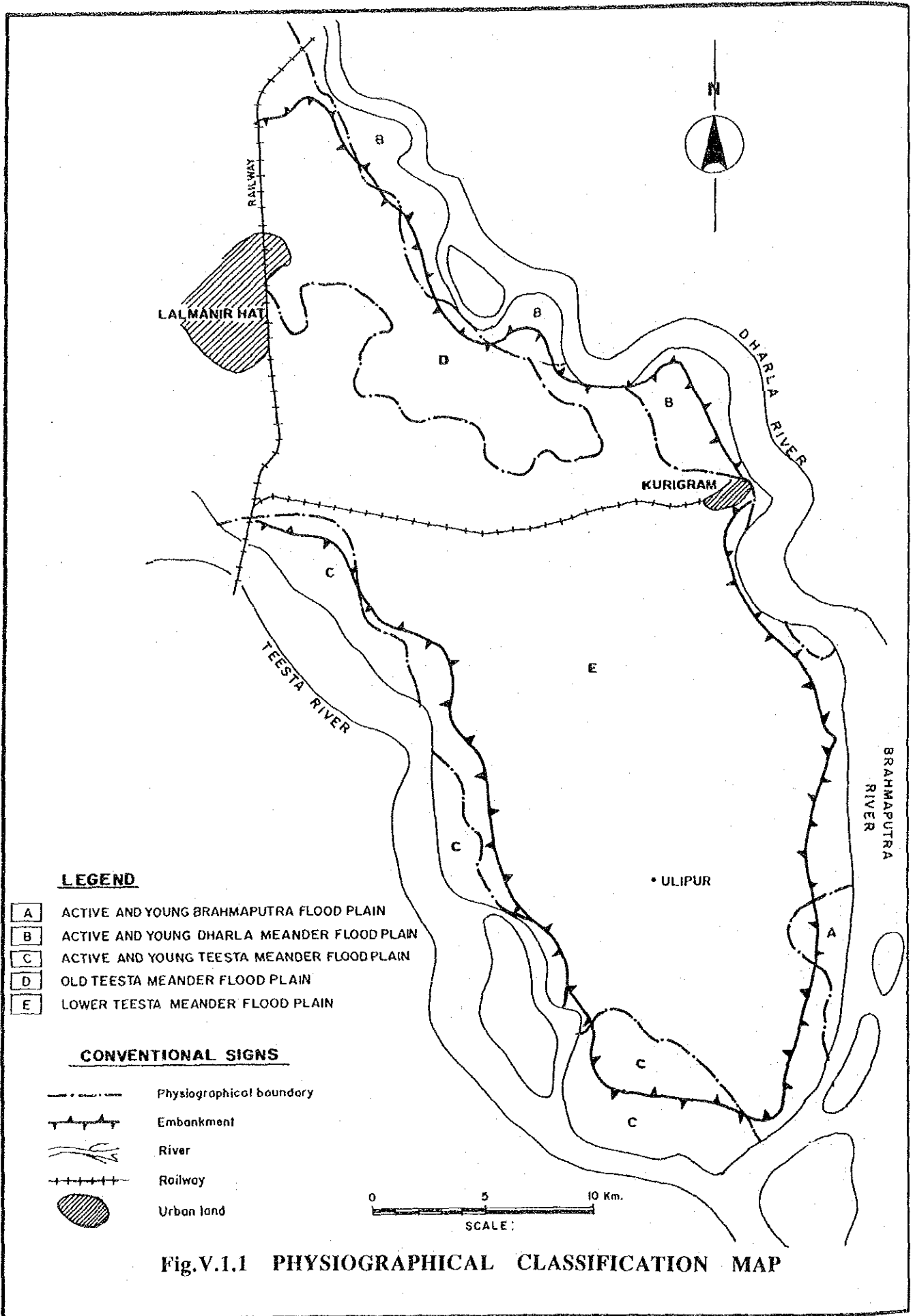


Fig.V.1.1 PHYSIOGRAPHICAL CLASSIFICATION MAP

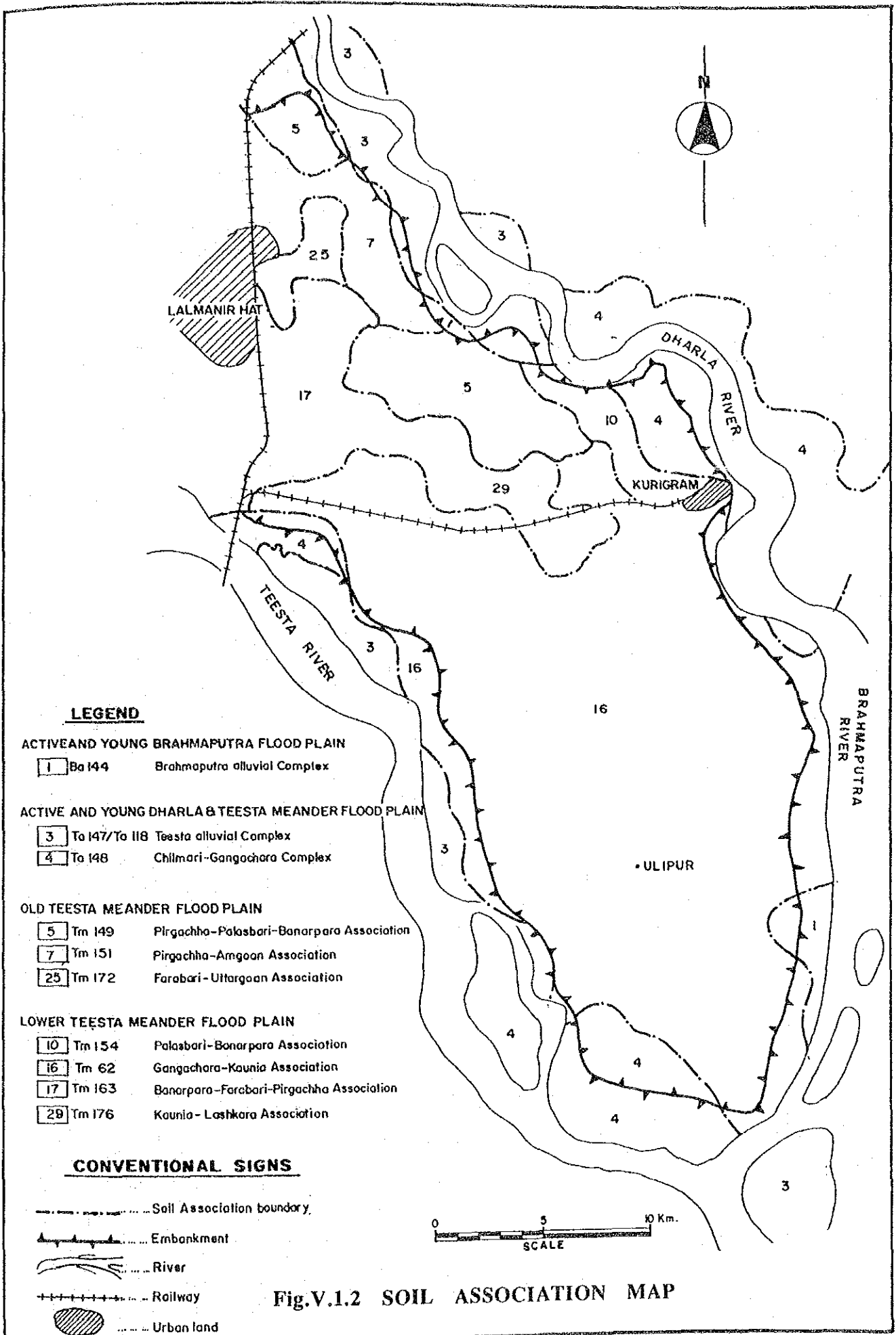


Fig.V.1.2 SOIL ASSOCIATION MAP

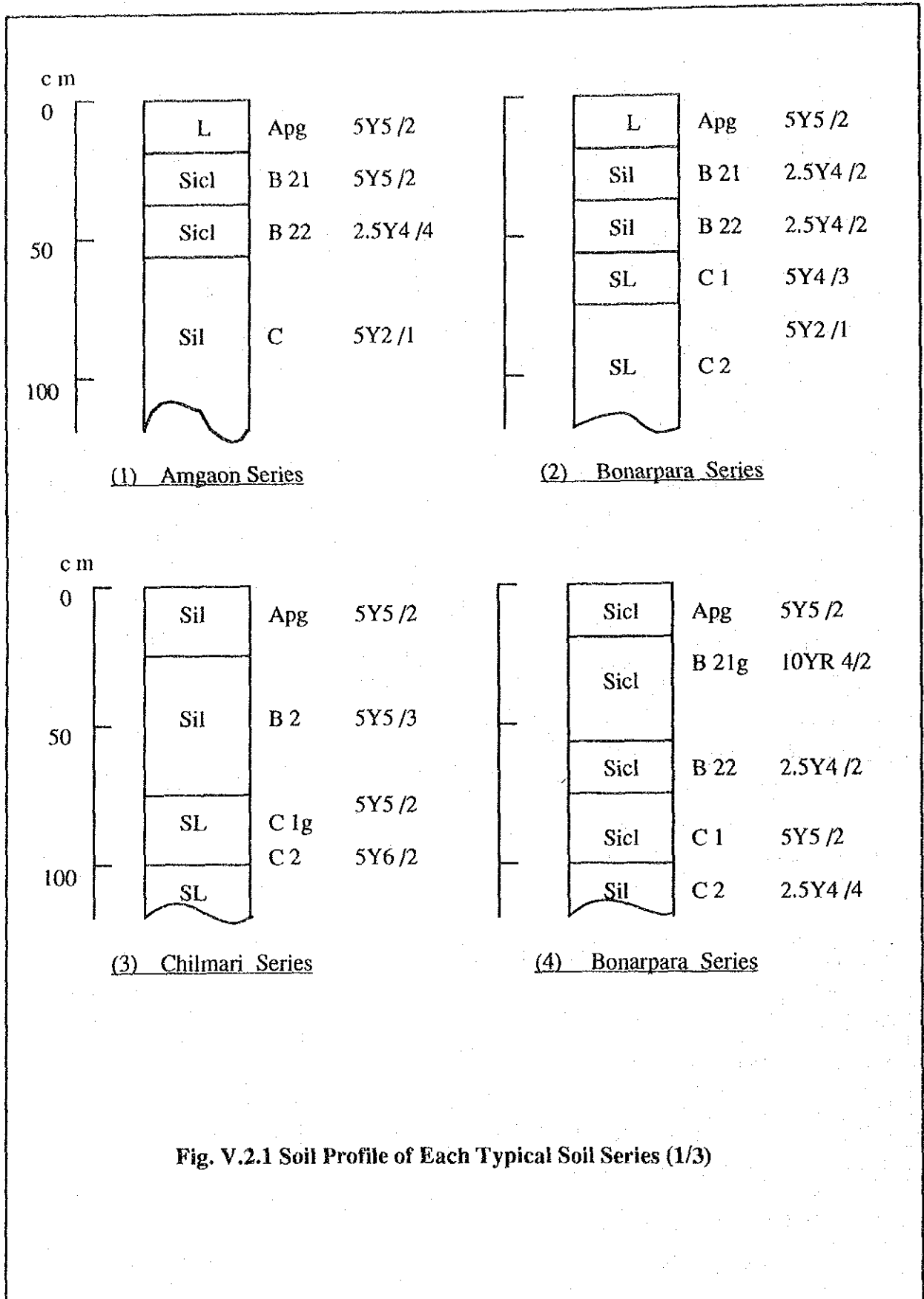
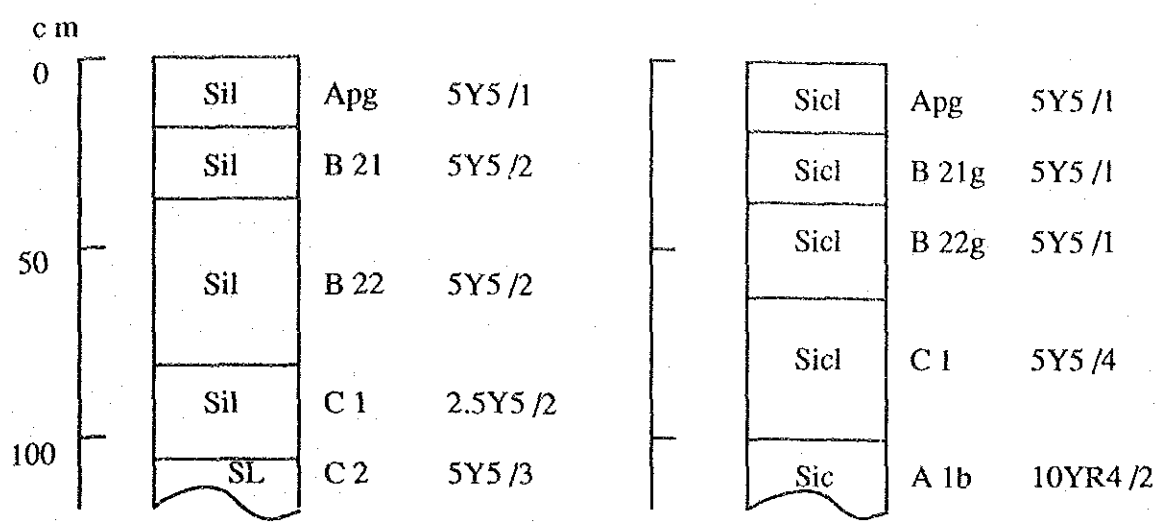
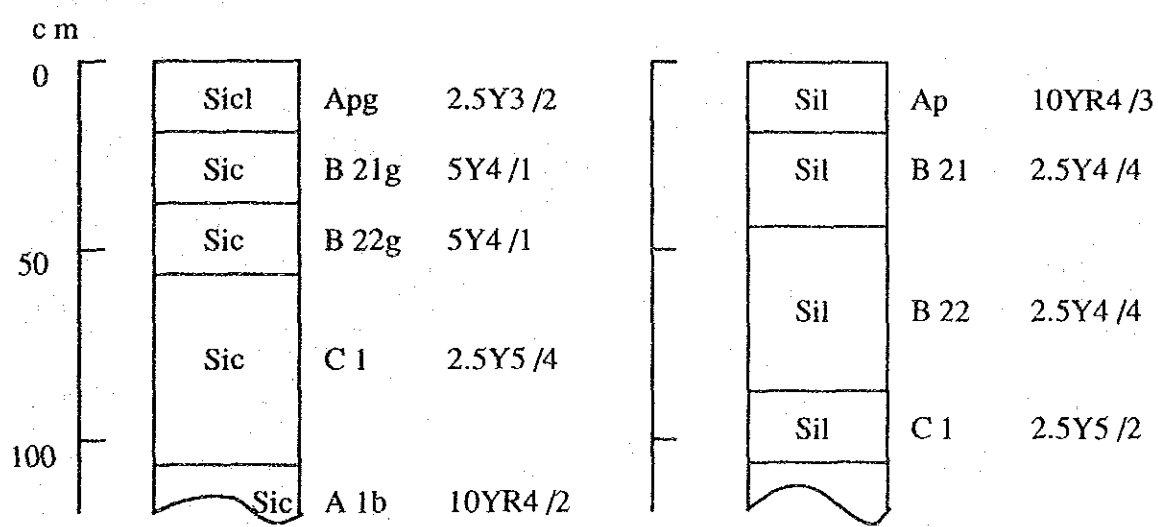


Fig. V.2.1 Soil Profile of Each Typical Soil Series (1/3)



(5) Gangachara Series

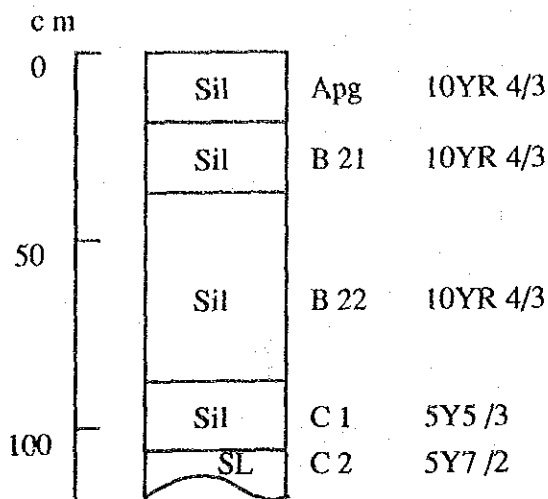
(6) Kaunia Series



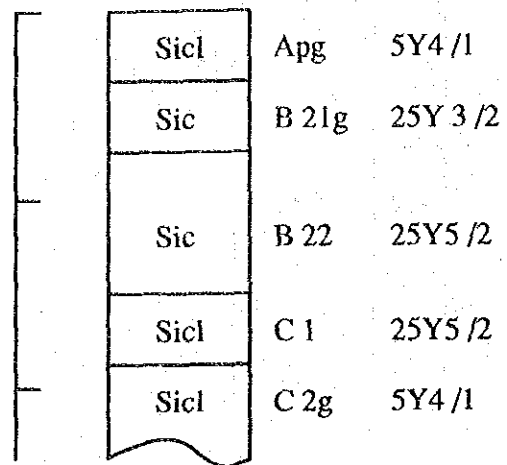
(7) Laskara Series

(8) Palashbari Series

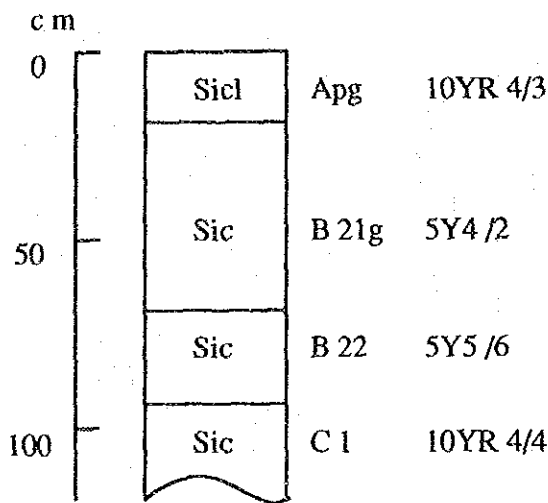
Fig. V.2.1 Soil Profile of Each Typical Soil Series (2/3)



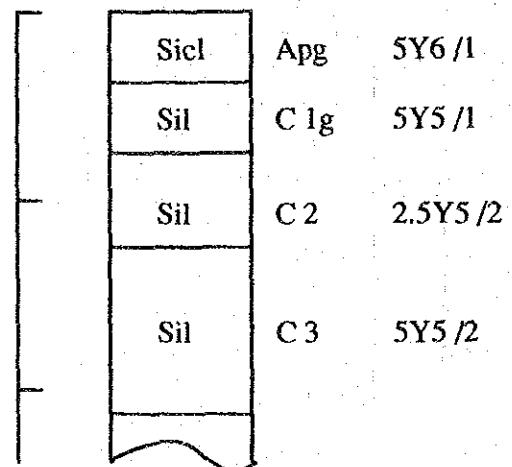
(9) Pargacha Series



(10) Uttargaon Series



(11) Ulipur Series



(12) Silty alluvium

Fig. V.2.1 Soil Profile of Each Typical Soil Series (3/3)

APPENDIX - VI

**SOCIO - ECONOMIC
BASELINE SURVEY**

**FEASIBILITY STUDY ON
KURIGRAM IRRIGATION AND FLOOD CONTROL PROJECT
(SOUTH UNIT)**

APPENDIX - VI SOCIO-ECONOMIC BASELINE SURVEY

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APPENDIX-VI SOCIO-ECONOMIC BASELINE SURVEY

1. General

For the assessment of the project impact to the different classes of farmers (landless, small, medium, large, and very large farmers) under the different flooded conditions (flood free ; F0, seasonally flooding ; F1, and flood prone areas ; F2&3), statistical socio-economic data in the study area were not available. The socio-economic baseline survey was carried out in the Phase II field survey following the preliminary survey in the Phase I which provided basic information and data for the sampling and questionnaire preparation. The field survey for socio-economic baseline survey was implemented from August 9 to September 3 in 1992 on a contract basis by the selected local consultant under the supervision of the Study Team. The collected data and information were compiled as a data base and those were analyzed to clarify the following aspects :

- 1) Demographic characteristics and employment pattern,
- 2) Land ownership and tenurial pattern and land transfer,
- 3) Land ownership and tenurial pattern,
- 4) Cropping pattern, cropping intensity, and production cost,
- 5) Irrigation practices,
- 6) Fishing and fish culture,
- 7) Livestock and poultry production,
- 8) Daily life socio-economic profile,
- 9) Cooperative and NGO, and
- 10) Training and extension, and constraints in farming activities.

This appendix presents the analytic results of the socio-economic baseline survey.

2. Methodology

Sampling survey methodology from the classification of mauzas to the sampling of respective class of farmers are as shown in Fig.VI.2.1 is summarized as follows :

- 1) The 325 mauzas (See Table VI.2.1) in the study area were classified into three (3) areas by flooded condition ; F0 (level of flood to be 0-30 cm), F1 (30-90 cm), and F2&3 (90-180 cm) ; on the basis of land type map,
- 2) The 325 mauzas were also classified into three (3) by number of household ; small (upto 149), medium (150-499), and large (more than 500) ; on the basis of the 1981 census (See Table VI.2.2),
- 3) From the above nine kinds of mauzas, the urban mauzas (four wards) and seven semi-urban mauzas were excluded and respective 10 % of mauzas (32 mauzas in total) were randomly selected (See Table VI.2.3, Table VI.2.4 and Fig. VI.2.2),
- 4) Complete (100%) census survey covering the 32 sampled mauzas were made and the number of family members, land holding and tenurial situation covering 9,115 households were prepared. The 9,115 households were classified into the five (5) household groups ; landless (land holding of below 0.2ha), small (0.2-0.5 ha), medium (0.6-1.9 ha), large (2.0-3.9 ha), and very large (more than 4.0 ha), and

- 5) Around 10% of 9,115 households were randomly selected from the respective farmer group at the different classes of mauzas. There were some mauzas where the required numbers of small and very large households could not be interviewed, hence other group households were sampled proportionally.

Questionnaire survey in the study area finally covered the 943 households at the representative 32 mauzas under three different flooded conditions. Sampling size kept at around 1% of the total households in the study area based on the census prepared by the Study Team. The number of households by group at different flooded conditions is summarized as follows :

Samples Household in the Study Area

(Unit : No. of sample households)

Household Group	Flooded Condition			Total
	F0 (0-30cm)	F1 (30-90cm)	F2&3 (90-180cm)	
Landless	229	233	84	546
Small	67	78	34	179
Medium	53	69	33	155
Large	18	18	5	41
Very Large	9	9	4	22
Total	376	407	160	943

3. Demography, Occupation and Education

3.1 Population and Household

The total population in the Study area consisting of 325 rural mauzas, 7 semi-urban mauzas and 4 wards (See Fig.VI.3.1) is estimated at 739,300 in 1992 as shown in Table VI.3.1. The total number of household is estimated at 130,500 with an average family member of 5.7 persons. The annual growth rates on number of household and population are estimated at 2.0 % and 2.2 % respectively through the year of 1981 to 1992 as follows :

Population and Household in the Study Area

Study Area	1981 Census (⁰⁰⁰)		1992 Projection (⁰⁰⁰)		Growth Rate (1981-92,%/year)	
	No. of Household	Popu- lation	No. of Household	Popu- lation	No. of Household	Popu- lation
Rural Area (325 Mauzas)	92.0	508.0	112.9	636.0	1.9	2.1
Semi-Urban (7 Mauzas)	4.0	20.9	5.5	29.7	2.9	3.2
Urban (4 Wards)	8.7	51.4	12.1	73.5	3.0	3.3
Total (Study Area)	104.7	580.3	130.5	739.2	2.0	2.2

Age and sex composition of the population for 943 sampled households is shown in Table VI.3.2. Demographic dependency ratio (population less than 14 and more than 65 years old divided by 15 - 64 ages population) is 0.783 which is lower than the national rural average of 0.943 in 1988-89 by the Household Expenditure Survey. The sex ratio is 111.9.

3.2 Occupation

Occupational distribution covering 9,115 households in the sampled 32 mauzas and 943 households selected for the survey is shown in Table VI.3.3 and VI.3.4 respectively. In terms of main source of family income, the share of agricultural households in the Study area excluding urban and semi-urban mauzas is estimated at around 78 %. Occupational distribution by household group is summarized as follows :

Occupational Distribution (943 Households)

Main Source of Income	(Unit : %)					Total
	Landless (<0.2ha)	Small (0.20-0.5ha)	Medium (0.6-1.9ha)	Large (2.0-3.9ha)	Very Large (4.0ha<)	
1. Agriculture	6.6	58.7	88.7	94.1	60.4	39.5
2. Fishery	3.7	0	0	0	0	1.9
3. Day Labour	62.1	25.1	0	0	0	37.1
4. Transport	9.0	3.8	1.0	0	0	5.6
5. Business	13.7	8.6	8.2	5.9	29.2	11.8
6. Others	4.9	3.8	2.1	0	10.4	4.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

3.3 Education

Illiteracy rate for the population over 7 years old of sampled 943 households (See Table VI.3.5) is estimated at 60.4% which is lower than 81.9 in Rangpur District in 1981 by the Population Census. Illiteracy rate is decreased by the scale of land holding ; landless (79%) to very large (24%). The male illiteracy rate (52%) is lower than the female (70%). Illiteracy rate for the population over 25 years old of sampled 943 households (See Table VI.3.6) is estimated at 66.4% which is higher than the rate over 7 years old. The share of population educated more than secondary school is around 14% to the total population over 25 years old.

4. Land Distribution and Tenurial Status

4.1 Tenurial Status in 32 Selected Mauzas

Census survey was carried out in 32 selected mauzas comprising 9,115 households. According to the data obtained from the census survey, 9,115 households have a total farm land of 3,812 ha with an average farm size is 0.42 ha as shown in Table VI.4.1. The landless group (including land holders less than 0.2 ha) occupies 5,372 or 59 % to the total households. Farmland is unevenly distributed, and 77 % of the total land is owned by 21 % of the households which are categorized as medium to very large sized households.

Distribution of Land Holding Size
(Census survey : 9,115 household in 32 mauzas)

	Landless (<0.2ha)	Small (0.20-0.5ha)	Medium (0.6-1.9ha)	Large (2.0-3.9ha)	Very Large (4.0ha<)	Total
1. No. of Households (%)	5,372 (58.9)	1,842 (20.2)	1,492 (16.4)	329 (3.6)	80 (0.9)	9,115 (100.0)
2. Owned Land						
- Area (ha)	234	657	1,589	869	463	3,812
- Distribution (%)	6.1	17.3	41.7	22.8	12.1	100.0
- Average (ha/H.H)	0.04	0.36	1.07	2.64	5.79	0.42

4.2 Tenurial Status for 943 Sample Households

The socio-economic baseline survey finally covered the 943 sample households in 32 selected mauzas. Average net operated cultivable land is 0.38 ha per household ranging 0.04 ha for landless to 3.20 ha for very large scale household. Distribution of land holding size and tenurial situation of the sample farmers are summarized as follows (for details, see Table VI.4.2) :

Distribution of Land Holding Size and Tenurial Situations
(Household survey : 943 household in 32 mauzas)

Farmers' Classification (Land scale)	943 Sampled Households in 32 selected Mauzas					Total
	Landless (<0.2ha)	Small (0.20-0.5ha)	Medium (0.6-1.9ha)	Large (2.0-3.9ha)	Very Large (4.0ha<)	
I. No. of Households (%)	546 (57.9)	179 (19.0)	155 (16.4)	41 (4.4)	22 (2.3)	943 (100.0)
II. Owned Land						
- Area (ha)	27.6	71.4	172.6	111.0	117.9	500.5
- Distribution (%)	5.5	14.3	34.5	22.2	23.5	100.0
- Average (ha/H.H)	0.05	0.40	1.11	2.71	5.36	0.53
III. Cultivable Owned Land						
- Area (ha)	12.4	54.7	140.2	89.9	94.2	391.4
- Distribution (%)	3.1	14.0	35.8	23.0	24.1	100.0
- Average (ha/H.H)	0.02	0.31	0.90	2.19	4.28	0.42
IV. Average Net Operated Land (ha of Cultivable Land/H.H)						
- Average In /_1	0.02	0.06	0.04	0.04	0.04	0.04
- Average Out /_1	0.01	0.06	0.09	0.28	1.13	0.07
- Net Operated Land	0.04	0.31	0.86	1.95	3.20	0.38

Note : /_1 ,Share cropped, mortgaged and leased cultivable land

109 households or 20% of the total landless households (546) are absolutely landless. Large and very large scale households (67% in number of their total households) lend out 20% of their total owned cultivable land. On the other hand, landless and small scale households (13% in number) lend in 45% of their total net operated land. Land out from landless and small scale households accounts for 6% and 29% in number and 20% and 18% in owned cultivable land. This means the land mortgage is prevailing in the marginal farmers.

Share cropping is predominant in the Study area. Produce in rainfed land is usually equally divided by the land owners and lessees who bear all production expenses. Seed is sometimes provided by the owners, while taken back from the produce after harvest. For irrigated land, the produce is divided into three parts equally. Each one is shared by owner and lessee and the rest shared by the input cost bearer. Cultivable land is leased out at Tk 4,490 to 7,480 /ha/year by land owners in the Study area.

5. Agricultural Production

5.1 Cropping Pattern and Cropping Intensity

Several crops are cultivated in varying flooded conditions through F0 to F2 & 3 areas. Around 79 % of the total harvested area in the 943 sample households are put under paddy cultivation. Jute covers about 12% and Wheat more than 4% as shown in Table VI.5.1. The maximum HYV Boro area is in F0 mauzas followed by F1 and F2&3 mauzas. HYV Aman has positive relation with flooded condition, because amount of area is found

gradually increased with the increase in flood depth. HYV Aus is more popular in less flood affected area. Wheat cultivation reveals inverse relation with flood type. The cultivators of flood prone areas do not find necessary time for its cultivation on account of water inundation. Jute receive the largest area in F0 mauzas. Tobacco is absent in the F2&3 mauzas and bears negative relation with flooded condition.

The choice of local variety and HYV paddy does not have very definite relation with socio-economic position of the households. For example, HYV Aus is relatively more popular among landless and small households. B Aus covers the maximum area among medium and large households followed by small, landless and very large households.

Of irrigated area, the largest part is covered by HYV Boro which is cultivated in winter season. HYV Aman, HYV Aus and potato are other three important crops in the irrigated area as shown in Table VI.5.2. In rainfed area, major crops are B Aus, LT Aman, Jute as well as HYV Aman. Total irrigated area is around 30% of the total harvested area.

Crop production yields by different conditions as shown in Table VI.5.3 are calculated on the basis of the data on 943 sample households. Yield rate distribution shows that HYV crop productivity levels are higher than those of traditional varieties. The relation between yield rate and flooded condition is not defined clearly as well as the relation with households' socio-economic position.

Cropping intensity of 943 sampled households is estimated at 193% in total as shown in Table VI.5.4. The cropping intensities in F0 and F1 areas are higher than those in F2&3 areas.

5.2 Agricultural Input Use

Family labour requirement for crop production for 943 sample households is shown in Table VI.5.5. The use of family labour in total labour requirement is higher among small farming groups. Larger farmer groups require more labour than the smaller groups and rely on the hired labour. Labour requirement varies by different crops. HYV crops require more labour than the local variety. Total labour use does not bear any consistent relation with socio-economic strata. Flooded condition does not also influence the labour requirement.

Use of owned draught animal for different crops is shown in Table VI.5.6. Use of hired draught animal is scale wise in case of poor and marginal cultivators. Lack of owned draught animal makes the small and marginal cultivators to rent it from the market. The draught animal requirement does not bear any consistent relation with flooded condition.

Fertilizer and pesticide and insecticide use for crop production is shown in Table VI.5.7 and 5.8 respectively. Use of fertilizer is far more in the cultivation of HYV crops than local varieties. Across the socio-economic groups, the use of fertilizer does not consistently vary. Flooded condition makes some influence on the quantity of fertilizer used, i.e. its application in F0 and F1 mauzas is more than that in F2&3. Pesticide and insecticide are now used both for HYV and local varieties, however the former requires higher quantity than the latter. Differential socio-economic position does not influence the application of agro-chemicals.

5.3 Irrigation

Both mechanized and manual operated irrigation practice is prevailing in the Study area. Ownership of 60 irrigation facilities was reported by the sample households. Of them, 16 are manual and the rest are mechanical consisting STW and DTW as shown in Table VI.5.9. Irrigation command area for manual irrigation facilities is less than 0.3 ha far less than the mechanical with 4 to 6 ha for STW and 19 to 26 ha for DTW as shown in Table VI.5.10. Manual operated irrigation facilities concentrate among landless, small and

medium households. STW ownership concentrates among the medium, large and very large households. Individual ownership of DTW is not common and owned by a group.

Possible source of replacement fund of the existing irrigation facilities is shown in Table VI.5.11. Own saving as the possible source is reported relatively more by the medium and very large households. Credit is identified more among medium and large households. Average fuel cost and useful life of irrigation facilities are shown in Table VI.5.12. Fuel consumption for different irrigation facilities depend on the magnitude of respective command area, cropping pattern as well as number of hours needed to be operated. Source of power (diesel or electricity) also determines cost of fuel. Annual fuel cost varies around 4,000 to 12,000 per one STW and 46,000 to 106,000 per one DTW. Useful life ranges 6 to 11 years for STW and 12 to 15 years for DTW.

5.4 Livestock and Poultry Raising

Per household availability of draught animal (buffalo and cattle) is shown in Table VI.5.13 and 5.14 respectively. Very large household has the maximum draught animal of 3.0 per household on average, while landless has the minimum of 0.65 against the total average of 1.16. The poor households are constrained by shortage of draught animal power. Regarding poultry raising, landless household has the minimum of 9.22 per household against the total average of 10.34.

Price of livestock and poultry is shown in Table VI.5.15. Adult buffalo and cattle are valued at 7,300 and 4,700 per head respectively. Hay and straw are main source of feed for livestock and poultry in the Study area is shown in Table VI.5.16.

6. Marketing and Prices

Share of home consumption to total food grain production varies 43% (HYV Boro) to 79% (Local Boro) for paddy and 40% for wheat on average as shown in Table VI.6.1. Subsistence condition on food grain production is more predominant among landless and small households, while marketing is more prevailing among large and very large groups. Potatoes, jute, tobacco and sugarcane are characterized as cash crops of which marketing shares range 71% (tobacco) to 94% (sugarcane) on average.

Regarding marketing time, the sale in harvesting season is greater with respect to HYV paddy than local. High cost of HYV production and necessity for quick recovery of cultivation cost for capital scarce cultivators make immediate sale of product after harvest. Socio-economic position of cultivators gets more influence on the proportion of sale at harvest and lean seasons. Small cultivators are more prone to sell at harvest season, while large cultivators are inclined for lean sale. Large farmers can retain their produce for lean sale to get higher prices. Seasonal fluctuation of crop prices is widely known as shown in Table VI.6.2.

Agricultural producers are sold at different places such as farmers' homestead, local markets, and government procurement centres. The crop price variation is related to seasonal variation, while places for product sale do not influence the price level clearly. As a matter of fact, crop price largely depends on a fact whether the producers are indebted to buyers regardless of the place of sale. Capital scarce cultivators often borrow from buyers of products.

7. Household Economy

7.1 Income and Expenditure

Family income and expenditure by household group are analyzed as shown in Table VI.7.1. Agricultural income accounts for 70% to the total income as shown below :

Income and Expenditure
(Household survey : 943 household in 32 mauzas)

Farmers' Classification (Land scale)	Landless (<0.2ha)	Small (0.20-0.5ha)	Medium (0.6-1.9ha)	Large (2.0-3.9ha)	Very Large (4.0ha<)	Total
1. <u>Income</u>						
- Agriculture	6,120	7,900	14,490	34,780	62,840	10,180
- Non-agriculture	2,550	3,660	5,590	11,530	33,240	4,260
Total	8,670	11,560	20,080	46,310	96,080	14,440
2. <u>Expenditure</u>						
- Agriculture	190	2,870	6,580	17,410	31,460	3,050
- Living Expenditure	8,120	7,640	11,370	18,620	37,570	9,620
- Others	360	870	1,190	3,490	4,980	820
Total	8,670	11,380	19,140	39,520	74,010	13,490
3. <u>Balance</u>						
	0	180	940	6,790	22,070	950

7.2 Land Transfer

The number of land trading households in last three years is 84 for purchase and 81 for sale in 943 sample households as shown in Table VI.7.2. Proportion of large and very large households who bought land is 25% to those total number, while that of landless and small households is limited to 5%. On the other hand, 46 in the landless and small households sold land against 15 in the large and very large group. It is obvious that the greater number in rich households bought land, while the poor households is prone to sell land.

The average scale of land trading is 0.08 ha per household both for purchase and sale as shown in Table VI.7.3. The land trading price is shown in Table VI.7.4.

7.3 Credit and Savings

Around 34% of the 943 sampled households is indebted. The proportion of indebted households gradually increase according to rise on socio-economic position as shown in Table VI.7.5. Definitely much more of landless and small households require loan but their credit standing is very low which constraints to access institutional and soft loan. Different purposes necessitate the credit. Cultivation is most common purpose by item. Land purchase, house construction and education purposes are far less important than subsistence, social ceremonies, medical treatment and marriage expenses which are grouped in the others' category.

Amount of credit per households is more among large and very large households than landless and small. Average amount per borrower ranges Tk 2,860 for landless to 35,280 for very large as shown in Table VI.7.6. The amount of outstanding loan is large in all households. Share of outstanding amount to the total amount of loan is 74 % on average as shown in Table VI.7.7.

In the rural money market, the informal source is still predominant. All categories of households borrow from traditional money lender (25% on average), trader (3%) as well as land owner (9%) as shown in Table VI.7.8. Traditional money lender is more important for small and medium households. Land owner is more important for landless and small. For all households, trader is less important than the money lender. Landless and small households borrow more from NGO and cooperatives, while banks are more accessible to large scale owners because of their credit worthiness. Annual interest rate by source of credit is shown in Table VI.7.9. The rate from the informal source is high as 120 to 150%. Institutional credit rate from cooperative and bank is 18 to 20%. NGO also asks 20%.

Saving condition by household group is shown in table VI.7.10. It is obvious that all of households hold poor savings, i.e. less than Tk 500 per landless to medium group and Tk 500 to 1,200 per large and very large group.

Table VI.2.1 List of Unions and Number of Mauzas in the Study Area

Thana	Union	Number of Mauza						
		Total	Flooded Condition			Scale of Mauza		
			F0	F1	F2&3	Small	Medium	Large
Chilmari	Ramna	3	2	0	1	0	0	3
	Ranigonj	3	2	0	1	0	1	2
	Thanahat	7	2	1	4	0	3	4
		13	6	1	6	0	4	9
Kurigram	Belgachha	11	6	4	1	6	5	0
	Holokhana	8	2	4	2	2	5	1
	Kanthalbari	12	4	7	1	4	7	1
	Mogal Bachha	4	2	0	2	1	3	0
		35	14	15	6	13	20	2
Lalmonirhat	Barabari	14	6	4	4	8	6	0
	Gokunda	3	1	0	2	1	1	1
	Kulaghat	9	2	5	2	3	4	2
	Mahendranagar	16	1	13	2	6	10	0
	Mogalhat	9	4	3	2	3	5	1
	Phanchagram	16	9	4	3	5	10	1
	67	23	29	15	26	36	5	
Rajarhat	Bidyanaada	4	1	3	0	1	3	0
	Chakir Pashar	14	7	0	7	8	5	1
	Ghariaidanga	13	4	7	2	7	5	1
	Chhinai	16	7	8	1	7	8	1
	Nazimkhan	12	7	5	0	3	9	0
	Rajarhat	23	7	6	10	15	8	0
	Umar Majid	14	5	9	0	8	5	1
	96	38	38	20	49	43	4	
Ulipur	Dhamsreni	10	6	3	1	3	7	0
	Bazar	6	2	0	4	0	2	4
	Buraburi	8	2	4	2	1	5	2
	Daldalia	11	3	6	2	4	4	3
	Dharanibari	10	7	2	1	1	7	2
	Durgapur	7	2	3	2	1	2	4
	Gunagacha	18	7	7	4	5	12	1
	Hatia	10	1	4	5	5	2	3
	Pundul	7	7	0	0	1	3	3
	Tabakpur	11	5	4	2	3	4	4
	Thetrai	8	3	5	0	1	4	3
	Ulipur	8	3	4	1	1	7	0
	114	48	42	24	26	59	29	
Total	32	325	129	125	71	114	162	49

Table VI.2.2 Population and Household of 325 Mauzas in the Study Area (1/2)

1981 Census					1992 Projection					1981 Census					1992 Projection								
No.	Name of Mauza	Union	Taluka	Flooded Area No. of Mauzas	Area Size	No. of House-holds	Population	Area Size	No. of House-holds	Population	No.	Name of Mauza	Union	Taluka	Flooded Area No. of Mauzas	Area Size	No. of House-holds	Population	Area Size	No. of House-holds	Population		
F0 ; Small Mauzas																							
1	Karjati Kalas	Theoni	Ulipur	FO	Small	44	256			53	309	122	Kimat Megha	Unar Majid	Rajshat	FI	Small	24	141			29	170
2	Agral	Punebaram	Rajshat	FO	Small	29	166			60	361	123	Kurani	Koltaghat	Lalmoinhat	FI	Small	26	144			31	176
3	Unar Prangul	Punebaram	Rajshat	FO	Small	52	341			62	341	124	Kurani	Koltaghat	Lalmoinhat	FI	Small	26	144			31	176
4	Khadri	Barabari	Lalmoinhat	FO	Small	55	275			66	332	125	Khatia Rupera	Karimnagar	Lalmoinhat	FI	Small	34	233			41	282
5	Rumzad	Chhinal	Rajshat	FO	Small	58	379			88	408	126	Madhat	Rajshat	Unar Majid	FI	Small	53	270			64	376
6	Abdul Hadi	Dakatia	Ulipur	FO	Small	63	435			75	576	127	Satpura	Unar Majid	Rajshat	FI	Small	59	404			71	458
7	Basoral	Nazimhan	Ulipur	FO	Small	66	358			79	433	128	Siddhanta Mahitbari	Pandi	Ulipur	FI	Small	62	381			74	460
8	Nik Kinha	Belgachha	Rajshat	FO	Small	67	375			80	455	129	Ramrupur Kumar	Hatia	Ulipur	FI	Small	63	359			75	434
9	Kishorendrabari	Guzalgachh	Lalmoinhat	FO	Small	68	438			81	529	130	Chobla	Chakri Pachar	Rajshat	FI	Small	67	353			80	402
10	Lakshatri	Durgapur	Kurigram	FO	Small	70	362			84	438	131	Chobla	Lalmoinhat	Lalmoinhat	FI	Small	69	358			83	433
11	Rumzad	Nazimhan	Rajshat	FO	Small	70	362			84	438	132	Hemokata	Mahendranagar	Lalmoinhat	FI	Small	70	381			84	460
12	Barabari	Barabari	Rajshat	FO	Small	77	354			92	428	133	Kanda	Rajshat	Rajshat	FI	Small	78	426			93	558
13	Almarai	Belgachha	Kurigram	FO	Small	79	486			104	468	134	Dian	Rajshat	Rajshat	FI	Small	78	426			93	558
14	Gobda	Charaidanga	Rajshat	FO	Small	81	444			97	537	135	Rajni Hazari	Moghat	Lalmoinhat	FI	Small	80	467			96	564
15	Gobda	Rajshat	Rajshat	FO	Small	82	364			98	410	136	Hemokata	Lalmoinhat	Lalmoinhat	FI	Small	82	468			98	385
16	Makar	Unar Majid	Rajshat	FO	Small	82	364			98	410	137	Rajni Koshi	Unar Majid	Rajshat	FI	Small	83	477			99	571
17	Char Nukket	Chakri Pachar	Rajshat	FO	Small	85	303			102	603	138	Sajani	Hatia	Ulipur	FI	Small	85	482			102	583
18	Char Nukket	Punebaram	Rajshat	FO	Small	85	303			102	603	139	Rajni Koshi	Dakatia	Ulipur	FI	Small	86	402			103	446
19	Char Nukket	Punebaram	Rajshat	FO	Small	85	303			102	603	140	Jaydeb Mahitbari	Unar Majid	Rajshat	FI	Small	87	600			122	646
20	Parsabali	Barabari	Rajshat	FO	Small	87	371			109	491	141	Rajaram	Dakatia	Ulipur	FI	Small	87	429			104	518
21	Gobda	Punebaram	Rajshat	FO	Small	87	371			109	491	142	Mokham	Belgachha	Kurigram	FI	Small	92	557			111	673
22	Gobda	Rajshat	Rajshat	FO	Small	90	427			108	512	143	Chob Chhainbari	Unar Majid	Rajshat	FI	Small	95	811			114	1,004
23	Kalua	Chhinal	Rajshat	FO	Small	91	577			109	697	144	Hanjibari	Mahendranagar	Lalmoinhat	FI	Small	96	702			113	745
24	Nahinam	Moghat	Kurigram	FO	Small	275	994			296	1,564	145	Nily	Chhinal	Rajshat	FI	Small	97	530			111	641
25	Rudra Ram	Barabari	Lalmoinhat	FO	Small	99	580			116	701	146	Deladin Prangul	Rajshat	Rajshat	FI	Small	100	511			102	585
26	Tahar Senarai	Chakri Pachar	Rajshat	FO	Small	99	580			116	701	147	Purb Gourabada	Mahendranagar	Lalmoinhat	FI	Small	103	555			126	671
27	Gangapada	Belgachha	Kurigram	FO	Small	100	453			120	550	148	Ramkhat	Unar Majid	Rajshat	FI	Small	105	546			126	660
28	Manuswar	Belgachha	Rajshat	FO	Small	100	453			120	550	149	Dhanajay	Unar Majid	Rajshat	FI	Small	108	708			126	904
29	Tana	Guzalgachh	Ulipur	FO	Small	101	719			121	669	150	Dudali	Punebaram	Rajshat	FI	Small	105	566			126	684
30	Pandari Upanchali	Rajshat	Rajshat	FO	Small	101	555			121	671	151	Tahar Nukket	Chakri Pachar	Rajshat	FI	Small	110	715			132	854
31	Sababali	Takpur	Ulipur	FO	Small	104	583			125	705	152	Jay Hari	Barabari	Lalmoinhat	FI	Small	111	598			133	723
32	Dhanraj	Adharnandi	Ulipur	FO	Small	104	583			125	705	153	Purnam	Chakri Pachar	Rajshat	FI	Small	113	630			135	761
33	Kishorendrabari	Guzalgachh	Ulipur	FO	Small	109	579			131	700	154	Chhinal	Chakri Pachar	Rajshat	FI	Small	115	661			138	798
34	Kumaraj	Unar Majid	Rajshat	FO	Small	110	601			132	726	155	Khatia Nubhanda	Chakri Pachar	Rajshat	FI	Small	115	657			138	754
35	Suklekhanda	Guzalgachh	Ulipur	FO	Small	111	680			133	822	156	Mahabari	Chhinal	Rajshat	FI	Small	119	675			143	816
36	Ajaya Mira	Chakri Pachar	Rajshat	FO	Small	114	705			137	852	157	Sakh Nagar	Barabari	Lalmoinhat	FI	Small	119	644			143	778
37	Tahar Senarai	Chakri Pachar	Rajshat	FO	Small	114	705			137	852	158	Ritoni Gobda	Charaidanga	Rajshat	FI	Small	121	660			145	798
38	Nahinam	Belgachha	Kurigram	FO	Small	121	702			145	844	159	Hemokata	Mahendranagar	Lalmoinhat	FI	Small	126	695			151	840
39	Tahar Senarai	Chakri Pachar	Rajshat	FO	Small	125	586			150	708	160	Seofa	Dakatia	Ulipur	FI	Small	129	591			155	690
40	Nahinam	Charaidanga	Rajshat	FO	Small	137	737			164	891	161	Bhim Sarua	Charaidanga	Rajshat	FI	Small	131	754			157	911
41	Nahinam	Dhanraj	Ulipur	FO	Small	137	664			164	803	162	Durgachhar	Rajshat	Rajshat	FI	Small	139	669			167	809
42	Tahar Senarai	Chakri Pachar	Rajshat	FO	Small	139	1,345			167	1,026	163	Singur	Mahendranagar	Lalmoinhat	FI	Small	140	784			167	945
43	Chakri Pachar	Chhinal	Rajshat	FO	Small	140	691			168	835	164	Mahakha Narayan	Karimnagar	Kurigram	FI	Small	140	711			168	839
44	Kishorendrabari	Chhinal	Rajshat	FO	Small	140	691			168	835	165	Unar Mahitbari	Takpur	Ulipur	FI	Small	145	807			174	975
45	Gobda	Mahendranagar	Lalmoinhat	FO	Small	146	780			175	943	166	Rajapur Koberi	Ulipur	Ulipur	FI	Small	147	710			176	858
46	Beswar	Belgachha	Kurigram	FO	Small	146	781			175	944	167	Adharnandi	Karimnagar	Kurigram	FI	Small	150	771			180	912
47	Koda Khana	Moghat	Lalmoinhat	FO	Small	149	933			176	1,132								4,401	24,863	3,300	25,812	
48	Balabara	Adharnandi	Ulipur	FO	Small	149	939			178	1,074												
sub-total						4,834	31,970			5,774	38,785												
F0 ; Medium Mauzas																							
49	Gayeri	Karimnagar	Kurigram	FO	Medium	151	861			176	1,023	168	Herdaga	Rajshat	Rajshat	FI	Medium	132	747			177	887
50	Chakri Pachar	Rajshat	Rajshat	FO	Medium	151	949			176	1,127	169	Tejpur	Mahendranagar	Lalmoinhat	FI	Medium	151	955			187	1,134
51	Rupur	Karimnagar	Kurigram	FO	Medium	155	819			180	973	170	Makha Dhad Gachh	Mahendranagar	Lalmoinhat	FI	Medium	161	960			187	1,140
52	Ajaya	Dakatia	Ulipur	FO	Medium	155	844			180	1,002	171	Purb Debbetar	Chhinal	Rajshat	FI	Medium	162	841			189	959
53	Tahar Senarai	Chakri Pachar	Rajshat	FO	Medium	155	1,008			187	1,197	172	Dhenkanar	Pandi	Ulipur	FI	Medium	163	739			190	949
54	Rupur	Nazimhan	Rajshat	FO	Medium	156	852			182	1,012	173	Masran	Mahendranagar	Lalmoinhat	FI	Medium	164	938			194	958
55	Rupur	Theoni	Ulipur	FO	Medium	156	947			182	1,125	174	Dhanajay	Mahendranagar	Lalmoinhat	FI	Medium	174	986			203	1,183
56	Purb Nadanga	Ulipur	Ulipur	FO	Medium	157	812			168	833	177	Jyestur	Chhinal	Rajshat	FI	Medium	174	880			203	1,183
57	Purb Nadanga	Guzalgachh	Ulipur	FO	Medium	162	1,001			189	1,189	178	Kajdanga	Chakri Pachar	Rajshat	FI	Medium	176	820			205	976
58	Devpara	Chhinal	Rajshat	FO	Medium	162	862			189	1,024	179	Khatia	Chakri Pachar	Rajshat	FI	Medium	217	1,156			283	1,405
59	Purb Nadanga	Rajshat	Rajshat	FO	Medium	163	943			192	1,122	180	Unar Majid	Unar Majid	Rajshat	FI	Medium	180	1,197			210	1,374
60	Rupur	Guzalgachh	Ulipur	FO	Medium	164	941			191	1,118	181	Khatia Nubhanda	Chakri Pachar	Rajshat	FI	Medium	184	647			214	1,204
61	Eje Majid Upanchali																						

Table VI.2.2 Population and Household of 325 Mauzas in the Study Area (2/2)

No.	Name of Mauza	Union	Thana	Flooded Condition	Mauza Size	1981 Census		1992 Projection		No.	Name of Mauzas	Union	Thana	Flooded Condition	Mauza Size	1981 Census		1992 Projection		
						No. of House-hold	Popu-lation	No. of House-hold	Popu-lation							No. of House-hold	Popu-lation	No. of House-hold	Popu-lation	
F1 ; Large Mauzas										F2&3 ; Small Mauzas										
246	Dakshin Dehala	Dehala	Ulipur	FI	Large	541	3,017	709	4,077	261	Sympur	Hatia	Ulipur	F2&3	Small	31	165	37	159	
247	Miser Bari	Chhinai	Rajshahi	FI	Large	547	2,808	717	3,794	262	Bambur	Heokhata	Kurigram	F2&3	Small	47	155	56	181	
248	Chakra Pasa Patrakpara	Chakra Pasbar	Rajshahi	FI	Large	579	3,382	759	4,130	263	Mafadong	Rajshahi	Rajshahi	F2&3	Small	51	271	61	328	
249	Hala Banga	Tectei	Ulipur	FI	Large	615	3,952	806	5,340	264	Nilkanta	Hatia	Ulipur	F2&3	Small	57	304	68	367	
250	Durgapur	Durgapur	Ulipur	FI	Large	652	3,605	854	4,871	265	Khalite	Rajshahi	Rajshahi	F2&3	Small	62	324	72	403	
251	Kupern	Dehala	Ulipur	FI	Large	702	3,500	920	4,729	266	Balpara	Rajshahi	Rajshahi	F2&3	Small	67	363	90	439	
252	Gopalpur	Dehala	Ulipur	FI	Large	750	4,202	954	5,678	267	Baghicha	Charikidanga	Rajshahi	F2&3	Small	68	405	81	488	
253	Ramesh Dhaniram	Gonalgachh	Ulipur	FI	Large	766	4,412	1,004	6,002	268	Gaurbalabh	Gonalgachh	Ulipur	F2&3	Small	29	135	34	135	
254	Bansobhara	Tahakpur	Ulipur	FI	Large	770	4,005	1,009	5,466	269	Kansurat	Rajshahi	Rajshahi	F2&3	Small	69	319	83	438	
255	Syam	Kanibalari	Kurigram	FI	Large	843	4,634	1,237	6,193	270	Dwarka	Adamstemi	Ulipur	F2&3	Small	70	260	84	435	
256	Ranagram	Kulighat	Lalmonirhat	FI	Large	860	4,884	1,127	6,599	271	Chhat Medhat	Rajshahi	Rajshahi	F2&3	Small	83	421	59	509	
257	Jamuna	Durgapur	Ulipur	FI	Large	899	4,714	1,178	6,370	272	Chitan Sitaram	Barabari	Lalmonirhat	F2&3	Small	86	468	105	566	
258	Aparbhata	Pandul	Ulipur	FI	Large	1,026	5,143	1,344	6,949	273	Charikidanga	Chhinai	Rajshahi	F2&3	Small	87	503	104	608	
259	Khanar Dhenkiram	Pandul	Ulipur	FI	Large	1,143	714	1,493	965	274	Azai Panchan Kasirahaj	Goururda	Lalmonirhat	F2&3	Small	91	474	109	511	
260	Peshat	Pandul	Ulipur	FI	Large	1,255	6,727	1,614	9,090	275	Duripal	Tahakpur	Ulipur	F2&3	Small	105	691	126	835	
										276	Swarp Chamara	Rajshahi	Rajshahi	F2&3	Small	114	713	137	862	
										277	Prasad Kalna	Kanibalari	Kurigram	F2&3	Small	118	672	141	812	
										278	Khanat Bidyabagia	Barabari	Lalmonirhat	F2&3	Small	118	711	141	871	
										279	Dudhach	Rajshahi	Rajshahi	F2&3	Small	142	749	170	903	
										280	Hatna	Kulighat	Lalmonirhat	F2&3	Small	150	741	180	1,132	
											sub-total				1,645	9,214	1,966	11,158		
F2&3 ; Medium Mauzas										F2&3 ; Large Mauzas										
281	Bunka	Moghat	Lalmonirhat	F2&3	Medium	154	783	179	932	312	Khatnari	Kulighat	Lalmonirhat	F2&3	Large	512	2,854	553	3,022	
282	Mihachob	Ulipur	F2&3	Medium	155	826	180	981	313	Panchagram Debukhi	Panchagram	Rajshahi	F2&3	Large	544	3,066	713	4,141		
283	Raje Mozal	Mahendranagar	Lalmonirhat	F2&3	Medium	159	873	185	1,017	314	Bagra Tahakpur	Tharshat	Chilmari	F2&3	Large	550	3,164	721	4,215	
284	Kate Khamar	Tahakpur	Ulipur	F2&3	Medium	161	926	187	1,100	315	Kalapani Baza	Baza	Ulipur	F2&3	Large	565	2,998	740	4,031	
285	Nritshahban	Ranigory	Chilmari	F2&3	Medium	164	834	191	990	316	Mech Baska	Tharshat	Chilmari	F2&3	Large	573	2,906	751	3,977	
286	Chat Hazarayan	Barabari	Lalmonirhat	F2&3	Medium	178	935	207	1,114	317	Khatnari	Tharshat	Chilmari	F2&3	Large	601	3,277	787	4,428	
287	Kakya	Moghat	Lalmonirhat	F2&3	Medium	178	1,012	207	1,214	318	Hijati Gopyara	Hatia	Ulipur	F2&3	Large	674	3,282	883	4,435	
288	Sindhanail	Gonalgachh	Ulipur	F2&3	Medium	187	956	218	1,335	319	Ranigory	Chilmari	F2&3	Large	712	3,830	933	5,210		
289	Mahachob	Gonalgachh	Ulipur	F2&3	Medium	189	1,041	230	1,236	320	Hatia Bhebes	Hatia	Ulipur	F2&3	Large	779	3,851	1,021	5,339	
290	Naman-Mahal	Rajshahi	Rajshahi	F2&3	Medium	212	1,161	247	1,379	321	Chat Baza	Baza	Ulipur	F2&3	Large	794	4,538	1,040	6,111	
291	Nagoba	Gonalgachh	Ulipur	F2&3	Medium	213	1,296	248	1,539	322	Gori Ragbaray	Durgapur	Ulipur	F2&3	Large	836	4,146	1,095	5,602	
292	Debhachan	Rajshahi	Rajshahi	F2&3	Medium	235	1,301	274	1,543	323	Baza	Baza	Ulipur	F2&3	Large	915	5,165	1,199	6,879	
293	Kashibasi	Gonalgachh	Ulipur	F2&3	Medium	237	1,236	276	1,448	324	Gori	Durgapur	Ulipur	F2&3	Large	919	5,498	1,204	7,429	
294	Ramlat	Panchagram	Rajshahi	F2&3	Medium	238	1,177	277	1,338	325	Khatna	Ratna	Chilmari	F2&3	Large	1,438	7,297	1,884	9,806	
295	Tapur Char	Hokhata	Kurigram	F2&3	Medium	248	1,262	289	1,499											
296	Mahabange	Moghat Bakhia	Kurigram	F2&3	Medium	258	1,578	300	1,874											
297	Kisanat Dhechagachh	Mahendranagar	Lalmonirhat	F2&3	Medium	276	1,785	321	2,120											
298	Bansharan	Moghat Bakhia	Kurigram	F2&3	Medium	278	1,531	324	1,813											
299	Belgachha	Belgachha	Kurigram	F2&3	Medium	281	1,428	331	1,698											
300	Ratob	Gonalgachh	Ulipur	F2&3	Medium	112	469	245	1,172											
301	Mosafi	Goururda	Lalmonirhat	F2&3	Medium	320	1,943	373	2,338											
302	Hariwar Talek	Rajshahi	Rajshahi	F2&3	Medium	323	1,963	378	2,331											
303	Hijati	Hatia	Ulipur	F2&3	Medium	334	1,839	404	2,209											
304	Prehin Naddanga	Ulipur	Ulipur	F2&3	Medium	367	1,914	427	2,373											
305	Moharari	Dharanibari	Ulipur	F2&3	Medium	367	1,768	427	2,100											
306	Sibaram	Barabari	Lalmonirhat	F2&3	Medium	381	2,068	445	2,456											
307	Bura Bari	Burabari	Ulipur	F2&3	Medium	160	601	229	1,178											
308	Gatlam	Charikidanga	Rajshahi	F2&3	Medium	415	2,153	483	2,557											
309	Khanar Baza	Baza	Ulipur	F2&3	Medium	466	2,647	543	3,341											
310	Palmari Karamanga	Tharshat	Chilmari	F2&3	Medium	471	2,445	548	2,904											
311	Saohite	Burabari	Ulipur	F2&3	Medium	478	2,726	557	3,277											
											sub-total				8,221	44,692	9,720	54,182		
											F2&3 ; Large Mauzas									
											312	Khatnari	Kulighat	Lalmonirhat	F2&3	Large	512	2,854	553	3,022
											313	Panchagram Debukhi	Panchagram	Rajshahi	F2&3	Large	544	3,066	713	4,141
											314	Bagra Tahakpur	Tharshat	Chilmari	F2&3	Large	550	3,164	721	4,215
											315	Kalapani Baza	Baza	Ulipur	F2&3	Large	565	2,998	740	4,031
											316	Mech Baska	Tharshat	Chilmari	F2&3	Large	573	2,906	751	3,977
											317	Khatnari	Tharshat	Chilmari	F2&3	Large	601	3,277	787	4,428
											318	Hijati Gopyara	Hatia	Ulipur	F2&3	Large	674	3,282	883	4,435
											319	Ranigory	Chilmari	F2&3	Large	712	3,830	933	5,210	
											320	Hatia Bhebes	Hatia	Ulipur	F2&3	Large	779	3,851	1,021	5,339
											321	Chat Baza	Baza	Ulipur	F2&3	Large	794	4,538	1,040	6,111
											322	Gori Ragbaray	Durgapur	Ulipur	F2&3	Large	836	4,146	1,095	5,602
											323	Baza	Baza	Ulipur	F2&3	Large	915	5,165	1,199	6,879
											324	Gori	Durgapur	Ulipur	F2&3	Large	919	5,498	1,204	7,429
											325	Khatna	Ratna	Chilmari	F2&3	Large	1,438	7,297	1,884	9,806
											F2&3 Total				10,412	55,945	13,524	74,704		
											GRAND TOTAL				91,973	508,009	112,899	636,024		

Table VI.2.3 Population and Household of the 32 selected Mauzas in 1981 and 1992 By Scale of Mauzas

No.	Name of Mauza	Household		Population		Growth rate(%/Year)	
		1981	1992	1981	1992	11.11	Population
I. Small Mauzas							
5.	Rankati	58	88	379	408	3.86	0.67
13.	Amaram	79	104	486	535	2.53	0.88
20.	Patrabish	87	89	371	404	0.21	0.78
24.	Nidhiram*	275	296	994	1,564	0.67	4.21
38.	Hariram	121	145	702	844	1.66	1.69
126.	Madhai	58	82	300	372	3.20	1.97
137.	Bhatibari	82	92	497	571	1.05	1.27
140.	Joydeb Malsabari	87	122	600	646	3.12	0.67
144.	Ranjiban	96	133	702	786	3.01	0.55
146.	Dakshin Prampati	100	102	511	585	0.18	1.24
265.	Khalisha	62	72	324	403	1.37	2.00
268.	Gauriballah*	29	34	135	175	1.46	2.39
	sub-total	1,134	1,359	6,001	7,253	1.66	1.74
II. Medium Mauzas							
56.	Purba Naudanga	157	168	812	833	0.62	0.23
75.	Ramkrishna	225	242	1,138	1,189	0.66	0.40
87.	Kasigari Haripur	279	287	1,344	1,411	0.26	0.44
88.	Purbasibbari	283	386	1,479	1,839	2.86	2.00
98.	Kedabag	395	419	2,203	2,205	0.54	0.01
173.	Monoram	164	184	938	998	1.05	0.57
179.	Khlistari	217	283	1,196	1,405	2.44	1.47
187.	Kamdeb	188	195	913	925	0.33	0.12
193.	Umar Panthabari	270	318	1,380	1,580	1.50	1.24
194.	Bara Mahismuri	213	248	1,061	1,337	1.39	2.12
201.	Kismat Malatibari	239	277	1,207	1,300	1.35	0.68
207.	Umapati Harinarayan	259	262	975	1,355	0.10	3.04
220.	Tanuram	385	394	1,596	1,807	0.21	1.14
300.	Ratideb*	112	245	469	1,172	7.38	8.68
303.	Hilzi	354	404	1,839	2,209	1.21	1.68
307.	Buraburi*	160	229	601	1,179	3.31	6.32
	sub-total	3,900	4,541	19,151	22,744	1.39	1.58
III. Large Mauzas							
104.	Subharkuthi*	313	482	1,104	2,657	4.00	8.31
112.	Patrakhata	786	943	3,742	4,792	1.67	2.27
255.	Sibram	843	1,237	4,634	6,195	3.55	2.67
312.	Khatamari	512	553	2,854	3,022	0.70	0.52
	sub-total	2,454	3,215	12,334	16,666	2.49	2.77
Total		7,488	9,115	37,486	46,663	1.80	2.01

Note : A part of mauzas

Source : JICA Socio-economic Baseline Survey, Kurigram South Unit, 1992

Table VI.2.4 Population and Household of the 32 selected Mauzas in 1982 and 1992 by Administration and Flooded Condition

No.	Name of Mauza	Flooded Condition	Scale of Mauza	Household		Population		Growth rate(%/Year)	
				1981	1992	1981	1992	11.11	Population
I. Kurigram									
13.	Amaram	F0	S	79	104	486	535	2.53	0.88
24.	Nidhiram*	F0	S	275	296	994	1,564	0.67	4.21
38.	Hariram	F0	S	121	145	702	844	1.66	1.69
104.	Subharkuthi*	F0	L	313	482	1,104	2,657	4.00	8.31
255.	Sibram	F1	L	843	1,237	4,634	6,195	3.55	2.67
	sub-total			1,631	2,264	7,920	11,795	3.03	3.69
II. Rajarhat									
5.	Ramkazi	F1	S	58	88	379	408	3.86	0.67
75.	Ramkrishna	F0	M	225	242	1,138	1,189	0.66	0.40
126.	Madhai	F1	S	58	82	300	372	3.20	1.97
140.	Joydeb Malsabari	F1	S	87	122	600	646	3.12	0.67
146.	Dakshin Prampati	F1	S	100	102	511	585	0.18	1.24
179.	Khlistari	F1	M	217	283	1,196	1,405	2.44	1.47
193.	Umar Panthabari	F1	M	270	318	1,380	1,580	1.50	1.24
265.	Khalisha	F2&3	S	62	72	324	403	1.37	2.00
	sub-total			1,077	1,309	5,828	6,588	1.79	1.12
III. Ulipur									
20.	Patrabish	F0	S	87	89	371	404	0.21	0.78
56.	Purba Naudanga	F0	M	157	168	812	833	0.62	0.23
87.	Kasigari Haripur	F0	M	279	287	1,344	1,411	0.26	0.44
88.	Purbasibbari	F0	M	283	386	1,479	1,839	2.86	2.00
187.	Kamdeb	F1	M	188	195	913	925	0.33	0.12
194.	Bara Mahismuri	F1	M	213	248	1,061	1,337	1.39	2.12
201.	Kismat Malatibari	F1	M	239	277	1,207	1,300	1.35	0.68
220.	Tanuram	F1	M	385	394	1,596	1,807	0.21	1.14
268.	Gauriballah*	F2&3	S	29	34	135	175	1.46	2.39
300.	Ratideb*	F2&3	M	112	245	469	1,172	7.38	8.68
303.	Hilzi	F2&3	M	354	404	1,839	2,209	1.21	1.68
307.	Buraburi*	F2&3	M	160	229	601	1,179	3.31	6.32
	sub-total			2,486	2,956	11,827	14,591	1.59	1.93
IV. Chilmari									
112.	Patrakhata	F0	L	786	943	3,742	4,792	1.67	2.27
IV. Lalmonirhat									
98.	Kedabag	F0	M	395	419	2,203	2,205	0.54	0.01
137.	Bhatibari	F1	S	82	92	497	571	1.05	1.27
144.	Ranjiban	F1	S	96	133	702	786	3.01	0.55
173.	Monoram	F1	M	164	184	938	998	1.05	0.57
207.	Umapati Harinarayan	F1	M	259	262	975	1,355	0.10	3.04
312.	Khatamari	F2&3	L	512	553	2,854	3,022	0.70	0.52
	sub-total			1,508	1,643	8,169	8,897	0.78	0.78
Total				7,488	9,115	37,486	46,663	1.80	2.01

Note : A part of mauzas

Source : JICA Socio-economic Baseline Survey, Kurigram South Unit, 1992

Table VI.3.1 Population and Household Projection in the Study Area

(1) Population and Household of 4 Wards in the Study Area

Ward	Thana	District	1981 Census		1992 Projection	
			No. of Household	Population	No. of Household	Population
1 Ward No. 2	Kurigram	Kurigram	2,729	17,290	3,778	24,711
2 Ward No. 3	Kurigram	Kurigram	1,966	11,770	2,721	16,822
3 Ward No. 2	Lalmonirhat	Lalmonirhat	1,670	9,421	2,312	13,465
4 Ward No. 3	Lalmonirhat	Lalmonirhat	2,371	12,937	3,282	18,490
Urban Total			8,736	51,418	12,093	73,488

** Based on Kurigram and Lalmonirhat Municipality Assessment, 1992 Growth rate ; 3.00%/a.n 3.3%/a.n

(2) Population and Household of 7 Semi-Urban Mauzas in the Study Area

Mauza	Union	Thana		1981 Census		1992 Projection	
				No. of Household	Population	No. of Household	Population
1 Chakirpazar Taluk	Rajarhat	Rajarhat	Fo	342	1,909	461	2,714
2 Chaturbhug	Rajarhat	Rajarhat	Fo	87	503	117	715
3 Runsing	Rajarhat	Rajarhat	Fo	70	362	94	515
4 Mekurtari	Rajarhat	Rajarhat	Fo	362	2,090	488	2,971
5 Khorkharia	Chilmari	Chilmari	Fl	1,706	8,837	2,299	12,563
6 Dharanibari	Ulipur	Ulipur	Fo	1,055	5,077	1,422	7,218
7 Hatiabari	Ulipur	Ulipur	Fo	427	2,131	575	3,030
Total Semi-Urban				4,049	20,909	5,456	29,726

*** Estimation based on Urban and Rural Average Growth rate ; 2.75%/a.n 3.25%/a.n

(3) Population and Household of the Study Area

Area	No. of Mauzas and Wards	1981 Census		1992 Projection	
		No. of Household	Population	No. of Household	Population
1 Rural Area	325	91,973	508,009	112,899	636,024
2 Semi-urban Area	7	4,049	20,909	5,456	29,726
3 Urban Area	4	8,736	51,418	12,093	73,488
Total	336	104,758	580,336	130,448	739,238

Table VI.3.2 Population Age and Sex Composition in the Survey Area, 943 Households

Age	F0			F1			F2&3			Total			Total (%)		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
0-4	130	119	249	126	109	235	48	41	89	304	269	573	11.7	11.7	11.8
5-9	154	177	331	158	170	328	75	66	141	387	413	800	15.1	18.0	16.5
10-14	137	117	254	127	125	252	71	48	119	335	290	625	13.0	12.6	12.8
15-19	106	66	172	95	71	166	34	35	69	235	172	407	9.1	7.5	8.4
20-25	92	95	187	75	102	177	35	38	73	202	235	437	7.9	10.2	9.0
25-29	91	99	190	103	73	176	44	32	76	238	204	442	9.3	8.9	9.1
30-34	80	44	124	66	59	125	33	22	55	179	125	304	7.0	5.5	6.2
35-39	80	44	124	66	59	125	33	22	55	179	125	304	7.0	5.5	6.2
40-44	46	45	91	63	44	107	21	17	38	130	106	236	5.0	4.6	4.8
45-49	28	41	69	36	48	84	19	19	38	83	108	191	3.2	4.7	3.9
50-54	40	28	68	33	16	49	16	14	30	89	58	147	3.5	2.5	3.0
55-59	26	17	43	18	16	34	10	9	19	54	42	96	2.1	1.8	2.0
60-64	29	14	43	30	27	57	12	7	19	71	48	119	2.8	2.1	2.4
65-	33	23	56	36	25	61	10	9	19	79	57	136	3.1	2.5	2.8
Total	1,070	944	2,014	1,040	959	1,999	460	394	854	2,570	2,297	4,867	100.0	100.0	100.0

Note: M; Male F; Female
 Source: Socio-economic Baseline Survey, JICA
 Demographic Dependency ratio: 0.783

Table VI.3.3 Occupational Distribution by Household and Flooded Condition in the Study Area

Household Category	Source of Income													
	Agriculture		Business		Service		Artisan		Day Labour		Others			
	No.	Main	Second	Main	Second	Main	Second	Main	Second	Main	Second	Main	Second	
Landless	5,372	498	523	538	102	141	4	108	11	3,536	294	551	113	
Fo	2,264	184	224	141	38	55	2	20	4	1,611	102	253	64	
F1	2,293	248	215	328	51	63	2	75	3	1,339	138	240	37	
F2&3	815	66	84	69	13	23	0	13	4	586	54	58	12	
Small	1,842	1,126	401	209	108	112	9	18	8	288	234	89	25	
Fo	687	463	126	64	37	45	3	4	2	84	87	27	11	
F1	802	484	180	103	53	43	5	11	4	113	99	48	9	
F2&3	353	179	95	42	18	24	1	3	2	91	48	14	5	
Medium	1,492	1,178	175	80	112	167	16	0	4	31	20	36	18	
Fo	528	414	60	22	33	70	7	0	1	10	12	12	12	
F1	688	538	91	48	62	73	8	0	3	10	4	19	5	
F2&3	276	226	24	10	17	24	1	0	0	11	4	5	1	
Large	329	271	38	9	20	41	12	1	0	1	1	6	3	
Fo	144	122	14	6	9	14	5	0	0	0	0	2	1	
F1	109	86	16	3	8	18	5	1	0	0	0	1	0	
F2&3	76	63	8	0	3	9	2	0	0	1	1	3	2	
Very Large	80	64	7	4	9	8	4	0	1	0	0	4	0	
Fo	26	19	2	1	1	4	3	0	0	0	0	2	0	
F1	37	31	4	3	7	2	1	0	1	0	0	1	0	
F2&3	17	14	1	0	1	2	0	0	0	0	0	1	0	
Total	9,115	3,137	1,144	840	351	469	45	127	24	3,856	549	686	159	

Note: Agricultural household (Agriculture; 3,137 and day laborer; 3,856); Share of agricultural household 6,993 / 9,115 = 76.7 %
 Source: Complete census (9,115 households) in 32 sampled mauzas, JICA

Table VI.3.4 Distribution of Family Members' Occupation for 943 Sampled Households

Household Category	Agriculture			Fishery			Day Labour			Transport			Business			Others			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Landless	No. 35	2	37	21	0	21	297	53	350	51	0	51	71	6	77	16	12	28	491	73	564
	(%) (6.2)	(0.4)	(6.6)	(3.7)	(0.0)	(3.7)	(52.7)	(9.4)	(62.1)	(9.0)	(0.0)	(9.0)	(12.6)	(1.1)	(13.7)	(2.8)	(2.1)	(4.9)	(87.0)	(13.0)	(100.0)
Small	No. 123	1	124	0	0	0	48	5	53	8	0	8	17	1	18	7	1	8	203	8	211
	(%) (58.2)	(0.5)	(58.7)	(0.0)	(0.0)	(0.0)	(22.7)	(2.4)	(25.1)	(3.8)	(0.0)	(3.8)	(8.1)	(0.5)	(8.6)	(3.3)	(0.5)	(3.8)	(96.1)	(3.9)	(100.0)
Medium	No. 171	2	173	0	0	0	0	0	0	2	0	2	16	0	16	4	0	4	193	2	195
	(%) (87.7)	(1.0)	(88.7)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(1.0)	(0.0)	(1.0)	(8.2)	(0.0)	(8.2)	(2.1)	(0.0)	(2.1)	(99.0)	(1.0)	(100.0)
Large	No. 64	0	64	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	68	0	68
	(%) (94.1)	(0.0)	(94.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(5.9)	(0.0)	(5.9)	(0.0)	(0.0)	(0.0)	(100.0)	(0.0)	(100.0)
Very Large	No. 29	0	29	0	0	0	0	0	0	0	0	0	14	0	14	5	0	5	48	0	48
	(%) (60.4)	(0.0)	(60.4)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(29.2)	(0.0)	(29.2)	(10.4)	(0.0)	(10.4)	(100.0)	(0.0)	(100.0)
Total	No. 422	5	427	21	0	21	345	58	403	61	0	61	122	7	129	32	13	45	1,003	83	1,086
	(%) (39.0)	(0.5)	(39.5)	(1.9)	(0.0)	(1.9)	(31.8)	(5.3)	(37.1)	(5.6)	(0.0)	(5.6)	(11.2)	(0.6)	(11.8)	(2.9)	(1.2)	(4.1)	(92.4)	(7.6)	(100.0)

Note: Percentage indicates over total employed population by household category.
 Other Occupation: Made servant, baby scater, tailor, fagger, barber, oilman, quilt making, cobbler, muslim priest, etc.
 Number of agricultural employees (agriculture; 427, fishery; 345, day laborer; 403); 551
 Percentage of agricultural employees 78.4 %
 Source: Socio-Economic Baseline Survey (943 sampled households), JICA

Table VI.3.5 Educational Status of 943 Sampled Household Members (Over 7 Years Old)

Educational Level		Landless			Small			Medium			Large			Very Large			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Illiterate	No. (%)	757 (73.1)	867 (85.2)	1,624 (79.2)	232 (48.5)	277 (69.9)	509 (58.2)	126 (26.2)	198 (48.2)	324 (36.4)	35 (20.7)	58 (47.9)	93 (32.0)	21 (20.4)	23 (27.7)	44 (23.7)	1,171 (51.7)	1,423 (70.2)	2,594 (60.4)
Non-Formal	No. (%)	37 (3.6)	15 (1.5)	52 (2.5)	23 (4.8)	5 (1.3)	28 (3.2)	16 (3.3)	9 (2.2)	25 (2.8)	6 (3.6)	2 (1.7)	8 (2.8)	0 (0.0)	1 (1.2)	1 (0.5)	82 (3.6)	32 (1.6)	114 (2.7)
Primary	No. (%)	177 (17.1)	112 (11.0)	289 (14.1)	142 (29.7)	92 (23.2)	234 (26.8)	180 (37.4)	137 (33.3)	317 (35.5)	47 (27.8)	42 (34.7)	89 (30.7)	21 (20.4)	26 (31.4)	47 (25.3)	567 (25.0)	409 (20.2)	976 (22.7)
Secondary	No. (%)	48 (4.6)	19 (1.9)	67 (3.3)	55 (11.5)	21 (5.3)	76 (8.7)	106 (22.0)	59 (14.4)	165 (18.5)	47 (27.8)	15 (12.4)	62 (21.4)	38 (36.9)	25 (30.1)	63 (33.9)	294 (13.0)	139 (6.9)	433 (10.1)
Higher Secondary	No. (%)	11 (1.1)	0 (0.0)	11 (0.5)	17 (3.6)	1 (0.3)	18 (2.1)	36 (7.5)	5 (1.2)	41 (4.6)	19 (11.2)	1 (0.8)	20 (6.9)	13 (12.6)	4 (4.8)	17 (9.1)	96 (4.2)	11 (0.5)	107 (2.5)
Graduate/Post Graduate	No. (%)	1 (0.1)	0 (0.0)	1 (0.0)	3 (0.6)	0 (0.0)	3 (0.3)	9 (1.9)	1 (0.2)	10 (1.1)	9 (5.3)	2 (1.7)	11 (3.8)	9 (8.7)	4 (4.8)	13 (7.0)	31 (1.4)	7 (0.3)	38 (0.9)
Madrassa/Others	No. (%)	4 (0.4)	4 (0.4)	8 (0.4)	6 (1.3)	0 (0.0)	6 (0.7)	8 (1.7)	2 (0.5)	10 (1.1)	6 (3.6)	1 (0.8)	7 (2.4)	1 (1.0)	0 (0.0)	1 (0.5)	25 (1.1)	7 (0.3)	32 (0.7)
Total	No. (%)	1,035 (100.0)	1,017 (100.0)	2,052 (100.0)	478 (100.0)	396 (100.0)	874 (100.0)	481 (100.0)	411 (100.0)	892 (100.0)	169 (100.0)	121 (100.0)	290 (100.0)	103 (100.0)	83 (100.0)	186 (100.0)	2,266 (100.0)	2,028 (100.0)	4,294 (100.0)
Literacy Rate (%)		26.9	14.8	20.8	51.5	30.1	41.8	73.8	51.8	63.6	79.3	52.1	68	79.6	72.3	76.3	48.3	29.8	39.6

Source : Socio-economic Baseline Survey, JICA

Table VI.3.6 Educational Status of 943 Sampled Household Members (Over 25 Years Old)

Household Category		Illiterate			Primary			Secondary			Above			Total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Landless	No. (%)	344 (70.9)	360 (90.9)	704 (79.9)	105 (21.6)	29 (7.3)	134 (15.2)	27 (5.6)	7 (1.8)	34 (3.9)	9 (1.9)	0 (0.0)	9 (1.0)	485 (100.0)	396 (100.0)	881 (100.0)
Small	No. (%)	96 (50.0)	144 (85.7)	240 (66.7)	63 (32.8)	17 (10.1)	80 (22.2)	24 (12.5)	7 (4.2)	31 (8.6)	9 (4.7)	0 (0.0)	9 (2.5)	192 (100.0)	168 (100.0)	360 (100.0)
Medium	No. (%)	54 (28.7)	121 (70.7)	175 (48.8)	63 (33.5)	35 (20.5)	98 (27.3)	47 (25.0)	13 (7.6)	60 (16.7)	24 (12.8)	2 (1.2)	26 (7.2)	188 (100.0)	171 (100.0)	359 (100.0)
Large	No. (%)	18 (24.0)	38 (70.4)	56 (43.4)	18 (24.0)	10 (18.5)	28 (21.7)	20 (26.7)	4 (7.4)	24 (18.6)	19 (25.3)	2 (3.7)	21 (16.3)	75 (100.0)	54 (100.0)	129 (100.0)
Very Large	No. (%)	14 (26.9)	15 (45.5)	29 (34.1)	8 (15.4)	11 (33.3)	19 (22.4)	16 (30.8)	6 (18.2)	22 (25.9)	14 (26.9)	1 (3.0)	15 (17.6)	52 (100.0)	33 (100.0)	85 (100.0)
Total	No. (%)	526 (53.0)	678 (82.5)	1,204 (66.4)	257 (25.9)	102 (12.4)	359 (19.8)	134 (13.5)	37 (4.5)	171 (9.4)	75 (7.6)	5 (0.6)	80 (4.4)	992 (100.0)	822 (100.0)	1,814 (100.0)

Source : Socio-economic Baseline Survey, JICA

Table VI.4.1 Distribution of Owned Land among Different Household Category by Flood Type in all Sampled Mauzas

Household Category	Household Number (No.)	Cultivable Land		Other Land		Total Land	
		Total (ha)	Average (ha/H.H)	Total (ha)	Average (ha/H.H)	Total (ha)	Average (ha/H.H)
Landless	5,372	96.64	0.02	136.80	0.03	233.44	0.04
Fo	2,264	40.54	0.02	51.10	0.02	91.64	0.04
F1	2,293	41.48	0.02	65.70	0.03	107.18	0.05
F2&3	815	14.62	0.02	20.00	0.02	34.62	0.04
Small	1,842	503.90	0.27	153.50	0.08	657.40	0.36
Fo	687	197.15	0.29	51.50	0.07	248.65	0.36
F1	802	215.78	0.27	69.10	0.09	284.88	0.36
F2&3	353	91.00	0.26	32.90	0.09	123.90	0.35
Medium	1,492	1,326.40	0.89	263.00	0.18	1589.40	1.07
Fo	528	465.29	0.88	84.40	0.16	549.69	1.04
F1	688	612.50	0.89	123.70	0.18	736.20	1.07
F2&3	276	248.64	0.90	54.90	0.20	303.54	1.10
Large	329	742.70	2.26	126.50	0.38	869.20	2.64
Fo	144	339.92	2.36	49.80	0.35	389.72	2.71
F1	109	238.71	2.19	40.30	0.37	279.01	2.56
F2&3	76	164.07	2.16	36.40	0.48	200.47	2.64
Very Large	80	411.30	5.14	51.50	0.64	462.80	5.79
Fo	26	137.21	5.28	14.50	0.56	151.71	5.84
F1	37	181.13	4.90	26.80	0.72	207.93	5.62
F2&3	17	92.96	5.47	10.10	0.59	103.06	6.06
Total	9,115	3,080.94	0.34	731.30	0.08	3,812.24	0.42

Source: Socio-economic Baseline Survey, JICA

Table VI.4.2 Land Holding and Tenure Situation in the Survey Area

(1) Land Holding Status (All Owned Land)

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	No.	223	67	51	17	8	366
	Total Area	ha	12.27	30.83	57.92	51.68	42.11	194.81
	Average Area	ha/H.H	0.06	0.46	1.14	3.04	5.26	0.53
F1	No. of H.H	No.	239	78	71	19	10	417
	Total Area	ha	10.85	28.99	71.01	45.86	51.06	207.77
	Average Area	ha/H.H	0.05	0.37	1.00	2.41	5.11	0.50
F2&3	No. of H.H	No.	84	34	33	5	4	160
	Total Area	ha	4.45	11.58	43.69	13.53	24.70	97.95
	Average Area	ha/H.H	0.05	0.34	1.32	2.71	6.18	0.61
Total	No. of H.H	No.	546	179	155	41	22	943
	Total Area	ha	27.57	71.40	172.62	111.07	117.87	500.53
	Average Area	ha/H.H	0.05	0.40	1.11	2.71	5.36	0.53

Note: All owned land includes homestead, pond, orchard, garden, farm and fallow land.

(3) Share Cropped, Mortgaged and Leased Cultivable Land from Owned Land (Out)

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	No.						
	- Out No.		11	19	19	15	8	72
	- Total No.		223	67	51	17	8	366
	Total Area	ha	0.75	4.04	5.56	4.49	7.67	22.51
	Average Area	ha/H.H	0.07	0.21	0.29	0.30	0.96	0.31
	- Out		0.003	0.06	0.11	0.26	0.96	0.06
F1	No. of H.H	No.						
	- Out No.		13	24	31	10	6	84
	- Total No.		239	78	71	19	10	417
	Total Area	ha	0.91	4.88	4.97	5.56	4.83	21.15
	Average Area	ha/H.H	0.07	0.20	0.16	0.56	0.81	0.25
	- Out		0.004	0.06	0.07	0.29	0.48	0.05
F2&3	No. of H.H	No.						
	- Out No.		8	9	12	2	1	32
	- Total No.		84	34	33	5	4	160
	Total Area	ha	0.82	1.13	3.46	1.42	12.29	19.12
	Average Area	ha/H.H	0.10	0.13	0.29	0.71	12.29	0.60
	- Out		0.010	0.03	0.10	0.28	3.07	0.12
Total	No. of H.H	No.						
	- Out No.		32	52	62	27	15	188
	- Total No.		546	179	155	41	22	943
	Total Area	ha	2.48	10.05	13.99	11.47	24.79	62.78
	Average Area	ha/H.H	0.08	0.19	0.23	0.42	1.65	0.33
	- Out		0.005	0.06	0.09	0.28	1.13	0.07

(5) Net Operated (Cultivable) Land (All Farmer)

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	No.	223	67	51	17	8	366
	Total Area	ha	9.78	27.13	46.85	38.39	30.66	152.81
	Average Area	ha/H.H	0.04	0.40	0.92	2.26	3.83	0.42
F1	No. of H.H	No.	239	78	71	19	10	417
	Total Area	ha	10.97	20.48	54.25	33.05	33.01	151.76
	Average Area	ha/H.H	0.05	0.26	0.76	1.74	3.30	0.36
F2&3	No. of H.H	No.	84	34	33	5	4	160
	Total Area	ha	2.38	8.25	32.01	8.57	6.65	57.86
	Average Area	ha/H.H	0.03	0.24	0.97	1.71	1.66	0.36
Total	No. of H.H	No.	546	179	155	41	22	943
	Total Area	ha	23.13	55.86	133.11	80.01	70.32	362.43
	Average Area	ha/H.H	0.04	0.31	0.86	1.95	3.20	0.38

(7) Percentage of Land Out to Owned Cultivable Land

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	%	4.9	28.4	37.3	88.2	100.0	19.7
	Total Area	%	14.8	15.9	11.6	10.8	20.1	14.2
F1	No. of H.H	%	5.4	30.8	43.7	52.6	60.0	20.1
	Total Area	%	17.7	23.5	8.7	14.4	12.8	13.3
F2&3	No. of H.H	%	9.5	26.5	36.4	40.0	25.0	20.0
	Total Area	%	37.3	13.2	9.9	14.2	67.8	25.8
Total	No. of H.H	%	5.9	29.1	40.0	65.9	68.2	19.9
	Total Area	%	20.0	18.4	10.0	12.8	26.3	16.0

(2) Land Holding Status (Owned Cultivable Land Only)

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	No.	223	67	51	17	8	366
	Total Area	ha	5.06	25.38	47.93	41.42	38.18	157.97
	Average Area	ha/H.H	0.02	0.38	0.94	2.44	4.77	0.43
F1	No. of H.H	No.	239	78	71	19	10	417
	Total Area	ha	5.13	20.77	57.18	38.51	37.84	159.43
	Average Area	ha/H.H	0.02	0.27	0.81	2.03	3.78	0.38
F2&3	No. of H.H	No.	84	34	33	5	4	160
	Total Area	ha	2.20	8.59	35.07	9.99	18.13	73.98
	Average Area	ha/H.H	0.03	0.25	1.06	2.00	4.53	0.46
Total	No. of H.H	No.	546	179	155	41	22	943
	Total Area	ha	12.39	54.74	140.18	89.92	94.15	391.38
	Average Area	ha/H.H	0.02	0.31	0.90	2.19	4.28	0.42

(4) Share Cropped, Mortgaged and Leased Cultivable Land from Other Land Owners (In)

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	No.						
	- In No.		27	20	19	2	2	70
	- Total No.		223	67	51	17	8	366
	Total Area	ha	5.47	5.79	4.48	1.46	0.15	17.35
	Average Area	ha/H.H	0.02	0.09	0.09	0.09	0.02	0.05
	- In		0.20	0.29	0.24	0.73	0.08	0.25
	- Total		0.02	0.09	0.09	0.09	0.02	0.05
F1	No. of H.H	No.						
	- In No.		31	21	14	3	0	69
	- Total No.		239	78	71	19	10	417
	Total Area	ha	6.75	4.59	2.04	0.10	0	13.48
	Average Area	ha/H.H	0.03	0.06	0.03	0.01	0	0.03
	- In		0.22	0.22	0.15	0.03	0	0.20
	- Total		0.03	0.06	0.03	0.01	0	0.03
F2&3	No. of H.H	No.						
	- In No.		5	5	8	5	1	24
	- Total No.		84	34	33	5	4	160
	Total Area	ha	1.00	0.79	0.40	0.00	0.81	3
	Average Area	ha/H.H	0.01	0.02	0.01	0.00	0.20	0.02
	- In		0.20	0.16	0.05	0.00	0.81	0.13
	- Total		0.01	0.02	0.01	0.00	0.20	0.02
Total	No. of H.H	No.						
	- In No.		63	46	41	10	3	163
	- Total No.		546	179	155	41	22	943
	Total Area	ha	13.22	11.17	6.92	1.56	0.96	33.83
	Average Area	ha/H.H	0.21	0.24	0.17	0.16	0.32	0.21
	- In		0.02	0.06	0.04	0.04	0.04	0.04
	- Total		0.02	0.06	0.04	0.04	0.04	0.04

(6) Net Operated (Cultivable) Land (Owner-cum-tenant farmer only)

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	No.	24	19	13	2	1	59
	Total Area	ha	6.43	10.79	13.67	5.80	0.81	37.5
	Average Area	ha/H.H	0.27	0.57	1.05	2.90	0.81	0.64
F1	No. of H.H	No.	27	17	12	1	0	57
	Total Area	ha	6.86	8.12	11.64	2.09	0	28.71
	Average Area	ha/H.H	0.25	0.48	0.97	2.09	0	0.50
F2&3	No. of H.H	No.	5	4	5	0	1	15
	Total Area	ha	1.17	1.82	4.82	0	0.15	7.96
	Average Area	ha/H.H	0.23	0.46	0.96	0	0.15	0.53
Total	No. of H.H	No.	56	40	30	3	2	131
	Total Area	ha	14.46	20.73	30.13	7.89	0.96	74.17
	Average Area	ha/H.H	0.26	0.52	1.00	2.63	0.48	0.57

(8) Percentage of Land Tenancy (In) to Net Operated (Cultivable) Land

Flooded condition/ Item	Household Group						Total	
	Landless	Small	Medium	Large	Very Large			
Fo	No. of H.H	%	12.1	29.9	37.3	11.8	25.0	19.1
	Total Area	%	55.9	21.3	9.6	3.8	0.5	11.4
F1	No. of H.H	%	13.0	26.9	19.7	15.8	0	16.5
	Total Area	%	61.5	22.4	3.8	0.3	0.0	8.9
F2&3	No. of H.H	%	6.0	14.7	24.2	0	25.0	15.0
	Total Area	%	42.0	9.6	1.2	0	12.2	5.2
Total	No. of H.H	%	11.5	25.7	26.5	24.4	13.6	17.3
	Total Area	%	57.2	20.0	5.2	1.9	1.4	9.3

Note: H.H: Household
Source: Socio-economic Baseline Survey (Aug-Sep 1992)

Table VI.5.1 Crop Production Area by Different Flooded Condition
(943 Sampled Households)

Crop	F0		F1		F2&F3		Total	
	Area (ha)	Share (%)	Area (ha)	Share (%)	Area (ha)	Share (%)	Area (ha)	Share (%)
B Aus	26.6	9.9	43.4	15.6	11.1	10.0	81.1	12.3
HYV Aus	20.4	7.6	10.7	3.8	4.6	4.2	35.7	5.4
B Aman	0.4	0.1	0	0.0	0	0	0.4	0.1
L T Aman	55.0	20.4	34.5	12.4	14.3	12.9	103.8	15.7
HYV Aman	55.9	20.6	77.0	27.5	32.2	29.0	165.1	25.0
Local Boro	2.3	0.9	0.5	0.2	0.3	0.3	3.1	0.5
HYV Boro	43.3	16.0	62.8	22.5	22.2	20.0	128.3	19.5
Wheat	15.4	5.7	10.2	3.7	2.5	2.3	28.1	4.3
Potato	2.6	1.0	9.1	3.3	0.8	0.7	12.5	1.9
Jute	40.9	15.2	21.8	7.8	14.0	12.7	76.7	11.6
Pulses	2.4	0.9	0.9	0.3	0.5	0.5	3.8	0.6
Oilseed	1.9	0.7	0.8	0.3	1.9	1.7	4.6	0.7
Vegetable	1.6	0.6	3.7	1.3	1.5	1.4	6.8	1.0
Tobacco	0.3	0.1	0.6	0.2	0	0	0.9	0.1
Sugarcane	0.9	0.3	2.3	0.8	4.2	3.8	7.4	1.1
Others	0	0	0.7	0.3	0.5	0.5	1.2	0.2
Total	269.9	100.0	279.0	100.0	110.6	100.0	659.5	100.0

Source : Soci-economic Household Survey, JICA

Table VI.5.2 Distribution of Irrigated and Rainfed Area by Crop
(943 Sampled Households)

Crop	Irrigated		Rainfed		Total	
	Area (ha)	Share (%)	Area (ha)	Share (%)	Area (ha)	Share (%)
B Aus	0	0	81.3	17.7	81.3	12.3
HYV Aus	23.7	11.8	12.0	2.6	35.7	5.4
B Aman	0	0	0.4	0.1	0.4	0.1
L T Aman	0	0	103.9	22.7	103.9	15.8
HYV Aman	23.4	11.7	141.8	31.0	165.2	25.1
Local Boro	2.3	1.1	0.9	0.2	3.2	0.5
HYV Boro	125.4	62.5	2.8	0.6	128.2	19.4
Wheat	15.6	7.8	12.7	2.8	28.3	4.3
Potato	8.2	4.1	4.3	0.9	12.5	1.9
Jute	0	0	76.7	16.7	76.7	11.6
Pulses	0	0	3.7	0.8	3.7	0.6
Oilseed	0	0	4.7	1.0	4.7	0.7
Vegetable	1.9	0.9	4.9	1.1	6.8	1.0
Tobacco	0.3	0.1	0.6	0.1	0.9	0.1
Sugarcane	0	0	7.4	1.6	7.4	1.1
Others	0	0	0.5	0.1	0.5	0.1
Total	200.8	100.0	458.6	100.0	659.4	100.0

Source : Soci-economic Household Survey, JICA

Table VI.5.3 Crop Production Yields by Different Condition
(943 Sampled Households)

Crops / Flooded Condition	Conditions		
	Irrigated	Rainfed	Total
Local Aus	0	1.6	1.6
Fo	0	1.7	1.7
F1	0	1.9	1.9
F2&3	0	1.5	1.5
HYV Aus	3.3	1.8	2.9
Fo	3.2	1.7	2.8
F1	3.4	1.9	3.1
F2&3	3.4	1.5	3.2
B Aman	0	2.3	2.3
Fo	0	2.3	2.3
F1	0	0	0
F2&3	0	0	0
HYV Aman	3.7	2.9	3.3
Fo	3.6	2.8	3.2
F1	3.9	3	3.4
F2&3	3.6	2.8	3.2
Local Boro	3.1	2.5	2.6
Fo	3.3	2.4	2.6
F1	2.9	2.4	2.5
F2&3	0	2.8	2.8
HYV Boro	4.9	4.1	4.5
Fo	4.9	4.1	4.3
F1	5.2	4.1	4.7
F2&3	4.7	4.0	4.4
Wheat	3.1	2.2	2.6
Fo	3.0	2.3	2.5
F1	2.5	2.2	2.9
F2&3	0	2.1	2.1
Potato	19.9	8.6	13.3
Fo	20.2	8.4	10.7
F1	19.5	8.9	14.0
F2&3	0	9.4	9.4
Vegetable	10.7	5.4	7.8
Fo	0	4.9	7.0
F1	11.9	5.9	8.1
F2&3	9.9	5.9	7.8
Tobacco	0	1.0	1.0
Fo	0	1.0	1.0
F1	0	1.1	1.1
F2&3	0	0	0
Oil Seed	0	1.0	1.0
Fo	0	1.0	1.0
F1	0	1.0	1.0
F2&3	0	0.9	0.9
Sugar Cane	0	23.1	23.1
Fo	0	20.7	20.7
F1	0	25.8	25.8
F2&3	0	22.2	22.2
Jute	0	1.7	1.7
Fo	0	1.5	1.5
F1	0	1.9	1.9
F2&3	0	1.6	1.6

Source : Socio-economic Baseline Survey, JICA

Table VI.5.4 Cropping Intensity by Household Group and Flooded Condition
(943 Sampled Households)

Household Group / Flooded Condition	Single Cropped Area		Double Cropped Area		Triple Cropped Area		Net Area (ha)	Total Cropped Area (ha)	Cropping Intensity (%)
	Area (ha)	Share (%)	Area (ha)	Share (%)	Area (ha)	Share (%)			
Landless	9.5	35.4	14.7	54.9	2.6	9.7	26.8	46.7	174
F0	3.1	31.6	5.8	59.2	0.9	9.2	9.8	17.4	178
F1	1.4	15.4	6.0	63.9	1.7	18.7	9.1	18.5	203
F2&3	5.0	63.3	2.9	36.7	0	0	7.9	10.8	137
Small	7.4	13.8	39.7	73.9	6.6	12.3	53.7	106.6	199
F0	2.6	12.5	15.9	76.4	2.3	11.1	20.8	41.3	199
F1	2.3	10.2	16.8	74.7	3.4	15.1	22.5	46.1	205
F2&3	2.5	24.0	7.0	67.3	0.9	8.7	10.4	19.2	185
Medium	19.8	17	84.2	72.5	12.2	10.5	116.2	224.8	193
F0	11.5	24.5	32.0	68.2	3.4	7.2	46.9	85.7	183
F1	5.4	11.4	35.4	74.8	6.5	13.7	47.3	95.7	202
F2&3	2.9	13.2	16.8	76.4	2.3	10.5	22.0	43.4	197
Large	18.9	24.4	48.4	62.5	10.1	13	77.4	146.0	189
F0	8.5	25.4	23.6	70.7	1.3	3.9	33.4	59.6	178
F1	8.0	25.5	16.4	52.2	7.0	22.3	31.4	61.8	197
F2&3	2.4	19.0	8.4	66.7	1.8	14.3	12.6	24.6	195
Very Large	7.8	11.2	54.1	78	7.5	10.8	69.4	138.5	200
F0	4.4	13.5	23.4	71.6	4.9	15	32.7	65.9	202
F1	2.8	9.3	25.0	83.1	2.3	7.6	30.1	59.7	198
F2&3	0.6	9.1	5.7	86.4	0.3	4.5	6.6	12.9	195
Total	63.4	18.5	241.1	70.2	39.0	11.4	343.5	662.6	193

Source : Socio-economic Household Survey, JICA

Table VI.5.5 Family Labour Requirement for Crop Production

Crop	Landless		Small		Medium		Large		Very Large		Total	
	Days	%	Days	%	Days	%	Days	%	Days	%	Days	%
	(Unit: Days/ha)											
Local Aus	87	61.5	97	62.6	58	38.9	59	36.0	62	42.5	72	46.8
HYV Aus	135	68.1	121	58.2	97	48.5	63	31.3	135	51.7	108	52.2
B Aman	0	0	239	59.2	33	51.0	0	0	0	0	136	58.1
L T Aman	106	66.2	94	65.9	74	45.5	73	42.5	86	44.5	86	51.0
HYV Aman	107	64.9	109	64.0	92	44.5	82	39.6	52	28.5	88	50.0
L Boro	62	30.1	112	81.4	62	58.8	198	82.8	0	0	73	57.3
HYV Boro	124	61.6	134	63.8	123	49.6	96	40.9	91	38.4	172	65.0
Wheat	101	74.6	91	68.7	58	41.6	54	34.2	57	39.8	72	48.0
Potato	160	76.9	157	46.9	86	37.2	105	31.6	128	42.3	125	47.6
Jute	137	71.8	105	55.8	95	44.1	106	47.5	73	24.6	103	48.2
Pulse	0	0	63	100.0	34	68.3	56	59.7	39	33.5	44	48.8
Oilseed	0	0	59	54.6	23	28.2	50	52.6	0	0	44	46.7
Vegetable	266	73.2	152	55.3	135	58.5	72	15.0	99	100.0	179	55.5
Tobacco	0	0	132	76.2	135	71.5	128	56.5	0	0	265	77.0
Sugercane	255	93.9	84	38.2	105	39.2	54	25.1	218	65.4	239	65.8
Other Minor	119	100	137	100	79	100	50	100	0	0	81	100

Note : Figure indicates the number of family labour days per ha and the percentage to the total labour requirement.
Source : Socio-economic Baseline Survey, JICA

Table VI.5.6 Use of Owned Draught Animal for Crop Production

Crop	Landless		Small		Medium		Large		Very Large		Total	
	Days	%	Days	%	Days	%	Days	%	Days	%	Days	%
	(Unit: Days/ha)											
Local Aus	9	26	13	38	16	48	24	74	25	76	17	52
HYV Aus	11	26	11	32	17	50	31	72	32	75	20	52
B Aman	0	0	0	0	14	48	0	0	0	0	14	48
L T Aman	6	19	18	53	16	48	22	80	23	80	17	56
HYV Aman	11	28	11	32	18	50	28	72	29	75	19	52
L Boro	9	30	12	41	15	50	6	58	0	0	11	42
HYV Boro	10	24	10	31	17	53	30	75	30	76	20	52
Wheat	14	29	10	29	18	49	32	71	21	73	19	49
Potato	17	40	17	40	20	48	25	61	25	64	20	50
Jute	7	20	11	32	16	48	28	78	29	81	18	52
Pulse	0	0	3	27	8	46	11	67	5	44	7	51
Oilseed	0	0	17	55	15	48	21	69	0	0	18	57
Vegetable	9	33	21	48	18	47	29	68	19	71	19	54
Tobacco	0	0	6	26	10	47	9	77	0	0	8	45
Sugercane	2	21	10	32	9	47	16	75	17	82	11	52
Other Minor	2	19	6	33	9	48	14	76	0	0	8	47

Note : Figure indicates the number of animal pair days per ha and the percentage to the total requirement.
Source : Socio-economic Baseline Survey, JICA

Table VI.5.7 Fertilizer Use for Crop Production

Crop	Landless		Small		Medium		Large		Very Large		Total	
	Kg/ha	Tk/ha	Kg/ha	Tk/ha	Kg/ha	Tk/ha	Kg/ha	Tk/ha	Kg/ha	Tk/ha	Kg/ha	Tk/ha
	(Unit: Kg/ha)											
Local Aus	33	202	32	197	46	282	78	481	36	222	45	277
HYV Aus	221	1368	186	1,133	233	1,445	209	1,294	211	1,310	212	1,314
L T Aman	43	265	0	0	64	399	84	521	0	0	38	237
HYV Aman	239	1480	286	1,743	302	1,874	241	1,492	221	1,370	258	1,598
L Boro	86	535	87	533	92	570	92	570	91	564	90	556
HYV Boro	257	1591	303	1,848	324	2,011	267	1,657	257	1,591	282	1,746
Wheat	304	1887	328	1,999	303	1,881	304	1,885	259	1,604	300	1,858
Potato	314	1884	360	2,160	372	2,232	272	1,632	299	1,791	323	1,940
Jute	87	524	89	534	118	708	95	570	89	531	96	573
Pulse	0	0	85	507	99	591	158	948	68	408	82	491
Oilseed	0	0	107	642	112	669	78	465	97	579	79	471
Vegetable	116	698	101	606	179	1,074	93	560	135	810	125	750
Tobacco	0	0	146	876	99	591	198	1,188	129	771	114	685
Sugercane	414	2484	429	2,572	371	2,226	368	2,210	400	2,400	396	2,378
Other Minor	160	960	151	906	168	1,005	151	903	145	870	155	929

Source : Socio-economic Baseline Survey, JICA

Table VI.5.8 Pesticide and Insecticide Use for Crop Production

Crop	Landless		Small		Medium		Large		Very Large		Total	
	lit/ha	Tk/ha	lit/ha	Tk/ha	lit/ha	Tk/ha	lit/ha	Tk/ha	lit/ha	Tk/ha	lit/ha	Tk/ha
	(Unit: lit/ha)											
Local Aus	0.4	80	0.5	86	0.4	65	0.3	46	0.6	102	0.4	76
HYV Aus	1.0	191	1.2	228	1.5	271	1.3	247	1.9	345	1.4	257
L T Aman	0.4	80	0	0	0.4	68	0.3	56	0	0	0.2	41
HYV Aman	1.3	253	1.3	253	1.5	285	1.2	222	1.1	215	1.3	246
L Boro	0.3	63	0.5	89	0.4	82	0.3	57	0.4	67	0.4	72
HYV Boro	1.2	228	1.3	241	1.4	260	1.3	253	1.7	329	1.4	262
Wheat	1.1	215	1.5	291	1.7	317	1.4	260	1.0	184	1.3	253
Potato	0.5	90	0.6	99	0.9	162	0.5	90	0.9	153	0.7	119
Jute	1.2	207	1.2	222	1.0	180	1.0	180	0.9	153	1.0	188
Pulse	0	0	0.5	81	0.7	117	0.6	99	0.6	108	0.5	81
Oilseed	0	0	0.7	117	0.4	63	0.6	99	0.6	108	0.4	77
Vegetable	0.3	48	0.8	150	0.3	54	0.5	90	0.6	99	0.5	88
Tobacco	0	0	0.4	63	0.5	81	0.3	54	0.4	63	0.3	52
Sugercane	1.6	279	1.2	210	1.1	192	1.1	198	1.4	252	1.3	226
Other Minor	0.6	108	0.4	63	0.3	54	0.3	45	0.3	54	0.4	65

Source : Socio-economic Baseline Survey, JICA

Table VI.5.9 Ownership of Irrigation Facilities by Household Group and Flooded Condition

Household Group / Flooded Condition	Mosti/Trade		STW		DTW	
	H.H. No.	(%)	H.H. No.	(%)	H.H. No.	(%)
Landless	4	25	1	3	0	0
F0	2	13	1	3	0	0
F1	1	6	0	0	0	0
F2&3	1	6	0	0	0	0
Small	7	44	3	8	1	17
F0	3	19	1	3	0	0
F1	4	25	1	3	1	17
F2&3	0	0	1	3	0	0
Medium	4	25	11	29	4	67
F0	1	6	3	8	0	0
F1	3	19	4	11	3	50
F2&3	0	0	4	11	1	17
Large	1	6	9	24	1	17
F0	1	6	3	8	0	0
F1	0	0	3	8	1	17
F2&3	0	0	3	8	0	0
				0		
Very Large	0	0	14	37	0	0
F0	0	0	6	16	0	0
F1	0	0	6	16	0	0
F2&3	0	0	2	5	0	0
Total	16	100	38	100	6	100

Source : Soci-economic Household Survey, JICA

Table VI.5.11 Possible Source of Replacement Fund for Irrigation Facilities

Household Group / Flooded Condition	Own Saving		Credit		Others	
	H.H. No.	(%)	H.H. No.	(%)	H.H. No.	(%)
Landless	0	0	1	8	0	0
F0	0	0	0	0	0	0
F1	0	0	0	0	0	0
F2&3	0	0	1	8	0	0
Small	2	20	1	8	1	17
F0	0	0	1	8	0	0
F1	1	10	0	0	1	17
F2&3	1	10	0	0	0	0
Medium	4	40	6	50	4	67
F0	0	0	1	8	0	0
F1	4	40	2	17	3	50
F2&3	0	0	3	25	1	17
Large	1	10	3	25	1	17
F0	0	0	0	0	0	0
F1	1	10	2	17	1	17
F2&3	0	0	1	8	0	0
Very Large	3	30	1	8	0	0
F0	1	10	1	8	0	0
F1	2	20	0	0	0	0
F2&3	0	0	0	0	0	0
Total	10	100	12	100	6	100

Source : Soci-economic Household Survey, JICA

Table VI.5.10 Irrigation Command Area for HYV Boro by Household Group and Flooded Condition (ha/machine)

Household Group / Flooded Condition	Mosti/Trade	STW	DTW
Landless	0.19	4.25	25.73
F0	0	0	0
F1	0	0	0
F2&3	0.19	4.25	25.73
Small	0.24	3.91	21.40
F0	0.22	3.13	21.40
F1	0.26	0	0
F2&3	0	4.68	0
Medium	0.26	4.11	21.38
F0	0.23	3.71	0
F1	0.29	4.16	19.23
F2&3	0	4.47	23.52
Large	0	5.01	22.68
F0	0	3.92	0
F1	0	5.33	22.68
F2&3	0	5.79	0
Very Large	0	5.11	0
F0	0	4.14	0
F1	0	5.03	0
F2&3	0	6.16	0

Source : Soci-economic Household Survey, JICA

Table VI.5.12 Average Fuel Cost and Useful Life of Irrigation Facilities

Household Group	STW		DTW	
	Fuel Cost (Tk/Year)	Useful Life (Year)	Fuel Cost (Tk/Year)	Useful Life (Year)
Landless	10,000	10	-	-
Small	6,667	11	46,082	12
Medium	3,682	9	105,575	15
Large	6,700	6	49,098	15
Very Large	11,678	6	-	-

Source : Soci-economic Household Survey, JICA

Table VI.5.13 Per Household Availability of Draught Animal
(Unit : No.)

Household Category	F0	F1	F2&3	Total
Landless	0.69	0.66	0.53	0.65
Small	1.48	1.41	1.68	1.46
Medium	1.57	2.34	2.00	1.91
Large	2.53	2.89	2.92	2.70
Very Large	2.55	3.27	3.49	3.00
Total	0.88	1.25	1.19	1.16

Source : Socio-economic Baseline Survey, JICA

Table VI.5.14 Per Household Availability of Poultry
(Unit : No.)

Household Category	F0	F1	F2&3	Total
Landless	7.88	10.70	10.50	9.22
Small	12.00	13.63	14.05	13.11
Medium	10.00	11.35	10.00	10.63
Large	10.50	12.05	9.40	11.07
Very Large	13.20	13.33	12.25	12.32
Total	9.12	11.14	11.19	10.34

Source : Socio-economic Baseline Survey, JICA

Table VI.5.15 Price of Livestock and Poultry
(Unit : Tk/No.)

Category	Buffalo	Cattle	Seep/ Goat	Chichen	Duck
Above 3 years old	7,300	4,700	1,950	0	0
2 - 3 years old	5,100	3,400	1,325	80	50
1 -2 years old	3,200	1,800	975	60	40
< 1 yaers old	1,900	1,100	400	30	20

Source : Socio-economic Baseline Survey, JICA

Table VI.5.16 Source of Feed for Livestock and Poultry
(Unit : Percentage of Household)

Category	Ntural Grazing	Hay/ Straw	Grass/ Legumes	Others	Total
F0	15	40	8	37	100
F1	12	43	6	39	100
F2&3	10	45	4	41	100

Source : Socio-economic Baseline Survey, JICA

Table VI.6.1 Share of Crop Sold to Total Production, and Share of Crop Sold during Harvesting and Lean Seasons

(Unit : %)

Crop	Landless			Small			Medium			Large			Very Large			Total		
	Crop Sold	Harvest Season	Lean Season	Crop Sold	Harvest Season	Lean Season	Crop Sold	Harvest Season	Lean Season	Crop Sold	Harvest Season	Lean Season	Crop Sold	Harvest Season	Lean Season	Crop Sold	Harvest Season	Lean Season
Local Aus	9.8	70.6	29.4	17.4	25.5	74.5	15.9	52.3	47.7	39	23.2	76.8	51.6	18.2	81.8	25.8	29.6	72.1
HYV Aus	12.0	100.0	0	15	87.1	12.9	25.4	66.4	33.6	39.7	6.2	93.8	53.5	14.9	85.1	29.2	45.4	54.6
B Aman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L T Aman	9.4	79.1	20.9	11.3	36.2	63.8	34.4	37.8	62.2	32.6	29.1	70.9	46.7	3.8	96.2	34.9	27.6	72.4
HYV Aman	12.9	51.3	48.7	20.2	38.1	61.9	38.6	36.3	63.7	55.8	16.2	83.8	65.9	11.1	88.9	44.1	22.0	78.0
Local Boro	5.6	100.0	0	16.8	100.0	0	45.7	40.4	59.6	0	0	0	0	0	0	21.4	38.8	61.2
HYV Boro	27.6	41.0	59.0	24.8	23.5	76.5	57.2	46.6	53.4	68	29.8	70.2	69.4	22.3	77.7	56.9	32.1	67.9
Wheat	35.7	82.2	17.8	42.6	48.8	51.2	74.2	74.8	25.2	31.9	61.4	38.6	80.7	54.2	45.8	60.4	62.5	37.5
Potato	49.5	67.0	33.0	72.8	72.8	27.2	71.9	80.7	19.3	72.4	98.1	1.9	83.1	77.2	22.8	71.7	82.4	17.6
Jute	74.5	61.7	38.3	83	65.1	34.9	84.8	55.3	44.7	94	26.7	73.3	89	28.7	71.3	85.9	46.2	53.8
Pulses	0	0	0	60	16.7	83.3	34.9	86.7	13.3	60.3	7.2	92.8	34.9	0	100.0	45.2	17.5	82.5
Oilseeds	0	0	0	52.2	0	100.0	37.7	40.0	60.0	17.9	0	100.0	0	0	0	34	19.7	80.3
Vegetable	67.2	100.0	0	49.4	100.0	0	49.6	100.0	0	40.9	100.0	0	14.9	100.0	0	48	100.0	0
Tobacco	0	0	0	74.6	100.0	0	68.4	100.0	0	74.6	100.0	0	0	0	0	70.9	100.0	0
Sugarcane	99.3	100.0	0	93.9	95.5	4.5	91.4	98.7	1.3	96.5	82.0	18.0	95.5	77.3	22.7	93.8	95.3	4.7
Other Minor	74.6	100.0	0	74.6	100.0	0	68.4	100.0	0	74.6	100.0	0	0	0	0	23.2	100.0	0
Total	29.3	71.0	29.0	32.5	62.0	38.0	53	62.0	38.0	60.6	44.0	56.0	69.6	24.0	76.0	53.3	48.0	52.0

Source : Socio-economic Baseline Survey, JICA

Table VI.6.2 Crop Selling Prices by Season

(Unit : Tk/ton)

Crop	Landless			Small			Medium			Large			Very Large			Total		
	Harvest Season	Lean Season	Ratio (%)	Harvest Season	Lean Season	Ratio (%)	Harvest Season	Lean Season	Ratio (%)	Harvest Season	Lean Season	Ratio (%)	Harvest Season	Lean Season	Ratio (%)	Harvest Season	Lean Season	Ratio (%)
Local Aus	5,334	5,334	100	5,772	6,325	110	5,601	6,027	108	5,467	6,147	112	5,467	6,668	122	5,558	6,273	113
HYV Aus	5,601	-	-	6,001	6,534	109	6,214	6,534	105	5,334	6,101	114	6,267	6,668	106	6,083	6,517	107
L T Aman	6,490	6,223	96	6,187	8,678	140	6,084	6,168	101	5,942	6,134	103	5,334	6,668	125	6,024	6,458	107
HYV Aman	4,801	6,972	145	6,363	6,705	105	6,411	6,849	107	5,734	6,481	113	7,268	6,692	92	6,407	6,654	104
Local Boro	6,119	-	-	6,001	-	-	4,241	5,867	138	4,001	4,801	120	4,001	5,867	147	5,338	5,359	100
HYV Boro	5,981	6,789	114	6,306	6,692	106	6,453	6,763	105	6,207	6,707	108	6,610	6,641	100	6,417	6,693	104
Wheat	3,045	6,001	197	6,015	6,294	105	5,923	6,419	108	5,867	6,187	105	5,690	6,179	109	5,869	6,258	107
Potato	6,131	4,089	67	3,042	4,161	137	3,243	4,534	140	3,086	4,267	138	1,867	4,001	214	3,037	4,303	142
Jute	16,002	5,369	34	6,326	7,396	117	6,155	6,471	105	6,363	6,407	101	6,267	6,342	101	6,217	6,444	104
Pulses	13,335	-	-	12,890	16,002	124	9,335	13,335	143	10,668	16,002	150	-	15,335	-	10,325	15,761	153
Oilseeds	2,045	-	-	-	15,335	-	14,224	-	-	-	13,335	-	8,001	-	-	12,651	14,669	116
Vegetable	67	-	-	-	-	-	2,979	-	-	2,400	-	-	2,667	-	-	2,615	-	-
Tobacco	-	-	-	13,335	-	-	8,174	17,336	-	20,003	-	-	-	-	-	11,006	17,336	158

Source : Socio-economic Baseline Survey, JICA

Table VI.7.1 Income and Expenditure by Household Group

Item (Sampling No.)	(Tk./Average Household)					Total
	Landless (223) (<0.2ha)	Small (67) (0.2-0.5ha)	Medium (51) (0.6-0.5ha)	Large (17) (2.0-3.9ha)	Very Large (8) (4.0ha+)	
I. Income						
1) Agriculture						
- Crops	3,030	6,560	13,380	33,430	61,660	7,810
- Livestocks	30	160	100	140	60	70
- Fish	250	130	40	0	50	180
- Casual farm wage	2,710	850	160	0	0	1,830
- Land lent	40	110	680	680	410	180
- Other	60	90	130	530	660	110
Sub-Total	6,120	7,900	14,490	34,780	62,840	10,180
2) Non-Agriculture						
- Non-farm wage	1,670	1,600	2,620	5,820	16,380	2,300
- Credit/Loan	820	1,960	2,750	5,350	16,040	1,840
- Other	60	100	220	360	820	120
Sub-Total	2,550	3,660	5,590	11,530	33,240	4,260
3) Total Income	8,670	11,560	20,080	46,310	96,080	14,440
II. Expenditure						
1) Agriculture	190	2,870	6,580	17,410	31,460	3,050
2) Living expenditure	8,120	7,640	11,370	18,620	37,570	9,620
3) Loan repayment	110	200	280	420	1,240	190
4) Others	250	670	910	3,070	3,740	630
Total	8,670	11,380	19,140	39,520	74,010	13,490
III. Balance						
	0	180	940	6,790	22,070	950

Source: Socio-economic Baseline Survey, JICA

Table VI.7.2 Land Trading in Last Three Years

Item	Total Household	Purchase		Selling	
		Yes	No	Yes	No
Landless					
No.	546	16	530	25	521
%	100	3	97	5	95
Small					
No.	179	23	156	21	158
%	100	13	87	12	88
Medium					
No.	155	29	126	20	13
%	100	19	81	13	87
Large					
No.	41	12	29	11	30
%	100	29	71	27	73
Very Large					
No.	22	4	18	4	18
%	100	18	82	18	82
Total					
No.	943	84	859	81	862
%	100	9	91	9	91

Source: Socio-economic Baseline Survey, JICA

Table VI.7.3 Area of Land per Trading Household

Item	Purchase		Selling	
	Household No.	Area per H.H (ha)	Household No.	Area per H.H (ha)
Landless	16	0.04	25	0.06
Small	23	0.06	21	0.09
Medium	29	0.09	20	0.06
Large	12	0.18	11	0.17
Very Large	4	0.07	4	0.07
Total	84	0.08	81	0.08

Source: Socio-economic Baseline Survey, JICA

Table VI.7.4 Purchase and Selling Price of Land

Item	(Unit: Tk/ha)					
	Purchase Price			Selling Price		
	1990	1991	1992	1990	1991	1992
Landless	126,100	148,800	175,000	171,200	190,900	126,100
Small	147,300	162,100	149,000	145,400	180,200	132,000
Medium	199,700	184,300	168,600	117,400	166,800	184,100
Large	118,200	179,100	159,100	185,200	147,800	188,200
Very Large	155,600	187,200			125,300	

Source: Socio-economic Baseline Survey, JICA

Table VI.7.5 Purpose of Credit by Household Group

Household Group	Total Sampled Household	Borrower Household					Total	
		Cultivation	Land Purchase	House Construction	Education	Others*		
Landless	No. (%)	546	31 (5.7)	4 (0.7)	4 (0.7)	3 (0.5)	126 (23.1)	168 (30.8)
Small	No. (%)	179	35 (19.6)	3 (1.7)	1 (0.6)	0 (0.0)	35 (19.6)	74 (41.3)
Medium	No. (%)	155	33 (21.3)	0 (0.0)	1 (0.6)	0 (0.0)	19 (12.3)	53 (34.2)
Large	No. (%)	41	8 (19.5)	1 (2.4)	0 (0.0)	1 (2.4)	8 (19.5)	18 (43.9)
Very Large	No. (%)	22	4 (18.2)	0 (0.0)	1 (4.5)	0 (0.0)	5 (22.7)	10 (45.5)
Total	No. (%)	943	111 (11.8)	8 (0.8)	7 (0.7)	4 (0.4)	193 (20.5)	323 (34.3)

Note: Percentage indicates over total number of household by household group. Others refer to credit primarily taken for subsistence, social ceremonies, medical treatment, and marriage expenditures.
Source: Socio-economic Baseline Survey, JICA

Table VI.7.6 Amount of Credit by Household

Household Group	Household Number	Cultivation		Land Purchase		House Construction		Education		Others		Total		
		Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	
Landless	Total	546	92,200	170	13,200	20	19,700	40	8,000	10	316,300	580	449,400	820
	Borrower	168		2,970		3,300		4,930		2,670		2,510		2,680
Small	Total	179	167,900	940	13,000	70	7,000	40	0	0	162,200	910	350,100	1,960
	Borrower	74		4,800		4,330		7,000		0		4,630		4,730
Medium	Total	155	267,300	1,720	0	0	30,000	190	0	0	128,400	830	425,700	2,750
	Borrower	53		8,100		0		30,000		0		6,760		8,030
Large	Total	41	134,000	3,270	7,000	170	0	0	29,000	710	106,200	2,590	276,200	6,740
	Borrower	18		16,750		7,000		0		29,000		13,280		15,340
Very Large	Total	22	104,800	4,760	0	0	65,000	2,950	0	0	183,000	8,320	352,800	16,040
	Borrower	10		26,200		0		65,000		0		36,600		35,280
Total	Total	943	766,200	810	33,200	40	121,700	130	37,000	40	896,100	950	1,854,200	1,970
	Borrower	323		6,900		4,150		12,906		9,250		4,640		5,740

Source: Socio-economic Baseline Survey, JICA

Table VI.7.7 Outstanding Loan by Household

Household Group	Household Number	Cultivation		Land Purchase		House Construction		Education		Others		Total		
		Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	Total Amount (Tk)	Per HH (Tk)	
Landless	Total	546	53,000	100	12,200	20	7,700	10	6,500	10	222,600	410	302,000	550
	Borrower	168		1,710		3,050		1,930		2,170		1,770		1,800
Small	Total	179	62,700	350	7,100	40	7,000	40	0	0	147,300	820	224,100	1,250
	Borrower	74		1,790		2,370		7,000		0		4,210		3,030
Medium	Total	155	173,300	1,120	0	0	0	0	0	0	119,800	770	293,100	1,890
	Borrower	53		5,250		0		0		0		6,310		5,530
Large	Total	41	166,000	4,050	14,000	340	0	0	0	0	87,500	2,130	267,500	6,520
	Borrower	18		20,750		14,000		0		0		10,940		14,860
Very Large	Total	22	48,000	2,180	0	0	62,000	2,820	0	0	172,000	7,820	282,000	12,820
	Borrower	10		12,000		0		62,000		0		34,400		28,200
Total	Total	943	503,000	530	33,300	40	76,700	80	6,500	10	749,200	790	1,368,700	1,450
	Borrower	323		4,530		3,531		8,134		1,630		3,880		4,240

Source: Socio-economic Baseline Survey, JICA

Table VI.7.8 Source of Credit by Household

Household Group	Mahajan		Trader		Land Owner		Relatives		Cooperatives/NGO Banks		Others		Total	
	Total Amount (Tk)	Share (%)	Total Amount (Tk)	Share (%)	Total Amount (Tk)	Share (%)	Total Amount (Tk)	Share (%)	Total Amount (Tk)	Share (%)	Total Amount (Tk)	Share (%)	Total Amount (Tk)	Share (%)
Landless	106,200	23.7	2,400	0.5	45,800	10.2	25,800	5.7	141,300	31.4	127,900	28.5	449,400	100.0
Small	98,300	28.1	7,200	2.1	28,000	8.0	23,200	6.6	113,400	32.4	80,000	22.8	350,100	100.0
Medium	116,300	27.4	15,000	3.5	50,400	11.8	43,500	10.2	124,500	29.2	76,000	17.9	425,700	100.0
Large	68,100	24.7	14,700	5.3	17,600	6.4	24,600	8.9	66,700	24.1	84,500	30.6	276,200	100.0
Very Large	78,300	22.2	12,900	3.7	16,900	4.8	27,100	7.7	93,000	26.4	124,600	35.2	352,800	100.0
Total	467,200	25.2	52,200	2.8	158,700	8.6	144,200	7.8	538,900	29.1	493,000	26.5	1,854,200	100.0

Source: Socio-economic Baseline Survey, JICA

Table VI.7.9 Annual Interest Rate by Source of Credit

(Unit : %)

Household	Mahajan	Trader	Land Owner	Relatives	Cooperative	NGO	Bank
Landless	150	127	140	90	20	20	16
Small	135	139	135	85	19	20	16
Medium	145	125	120	107	19	20	16
Large	120	130	136	75	20		16
Very Large	130	115	120	82	18		16

Source : Socio-economic Baseline Survey, JICA

Table VI.7.10 Saving Condition by Household Group

Household Group	Total Sampled Household	Savings			Saving per H.H (TK/H.H)
		Total (Tk.)	Coop. & NGO (Tk.)	Share of Coop. & NGO (%)	
Landless	546	7,400	3,500	47.3	10
Small	179	18,300	2,700	14.8	100
Medium	155	68,100	8,800	12.9	440
Large	41	50,000	2,000	4.0	1,220
Very Large	22	10,000	4,500	45.0	450
Total	943	153,800	21,500	14.0	160

Source : Socio-economic Baseline Survey, JICA

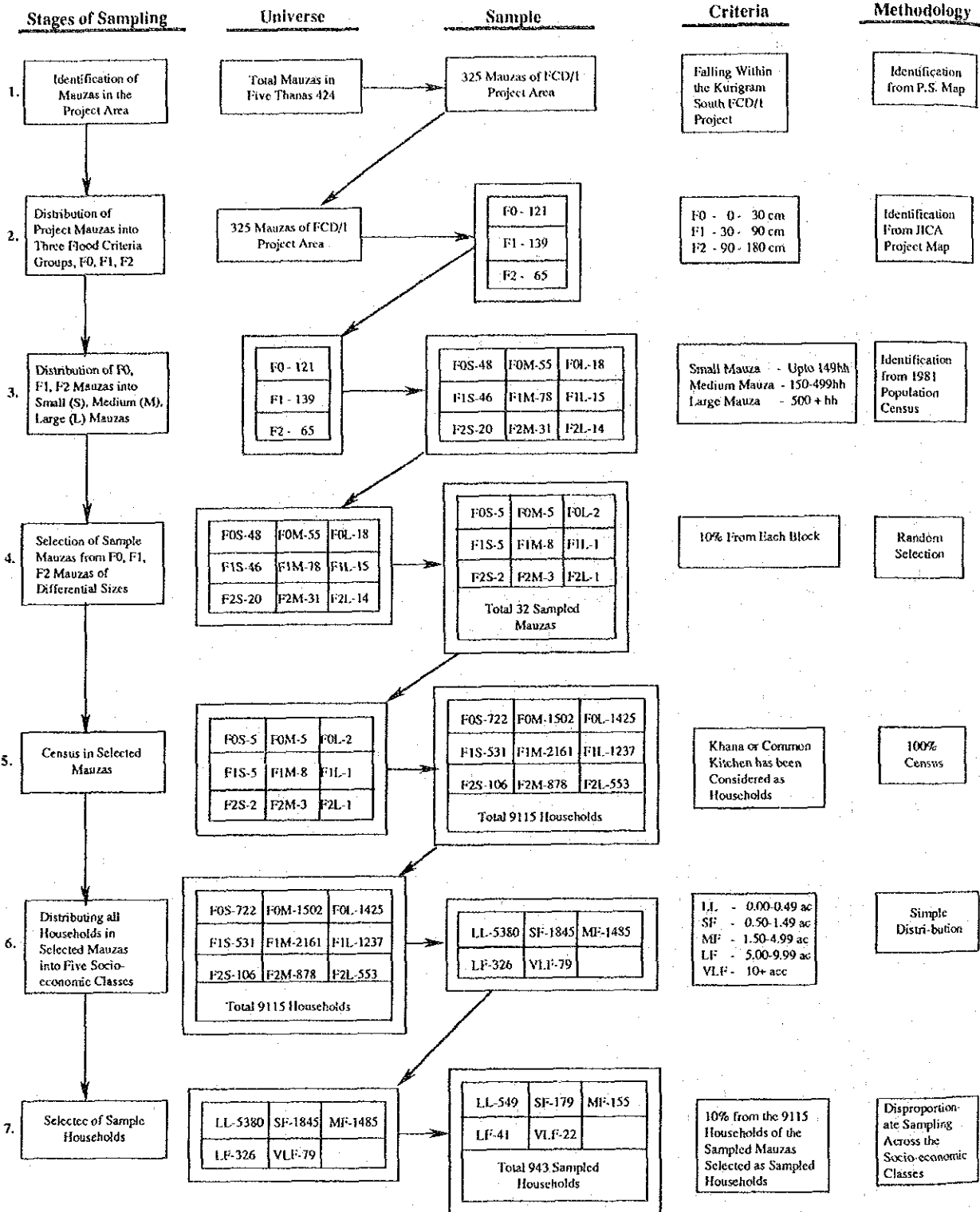
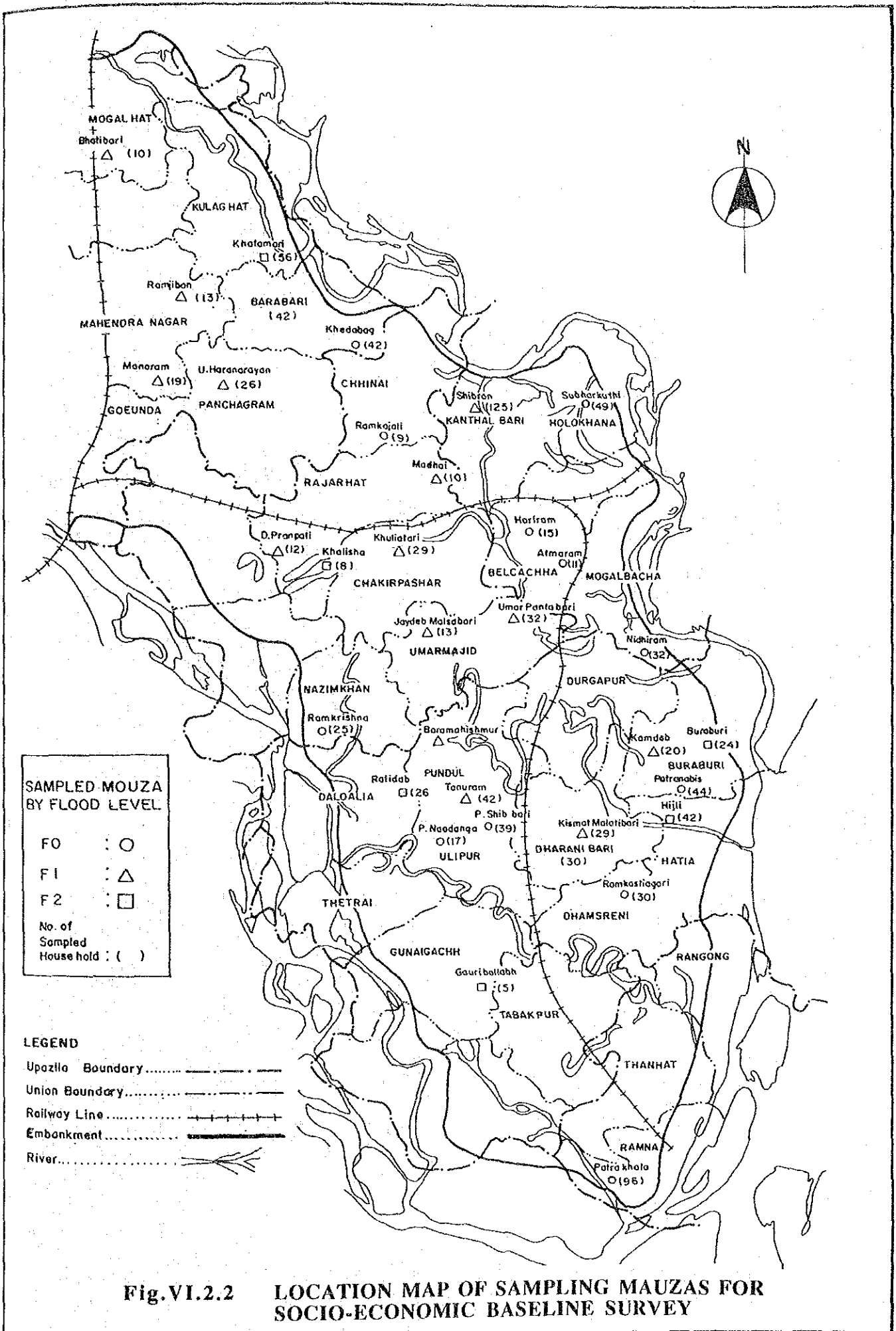
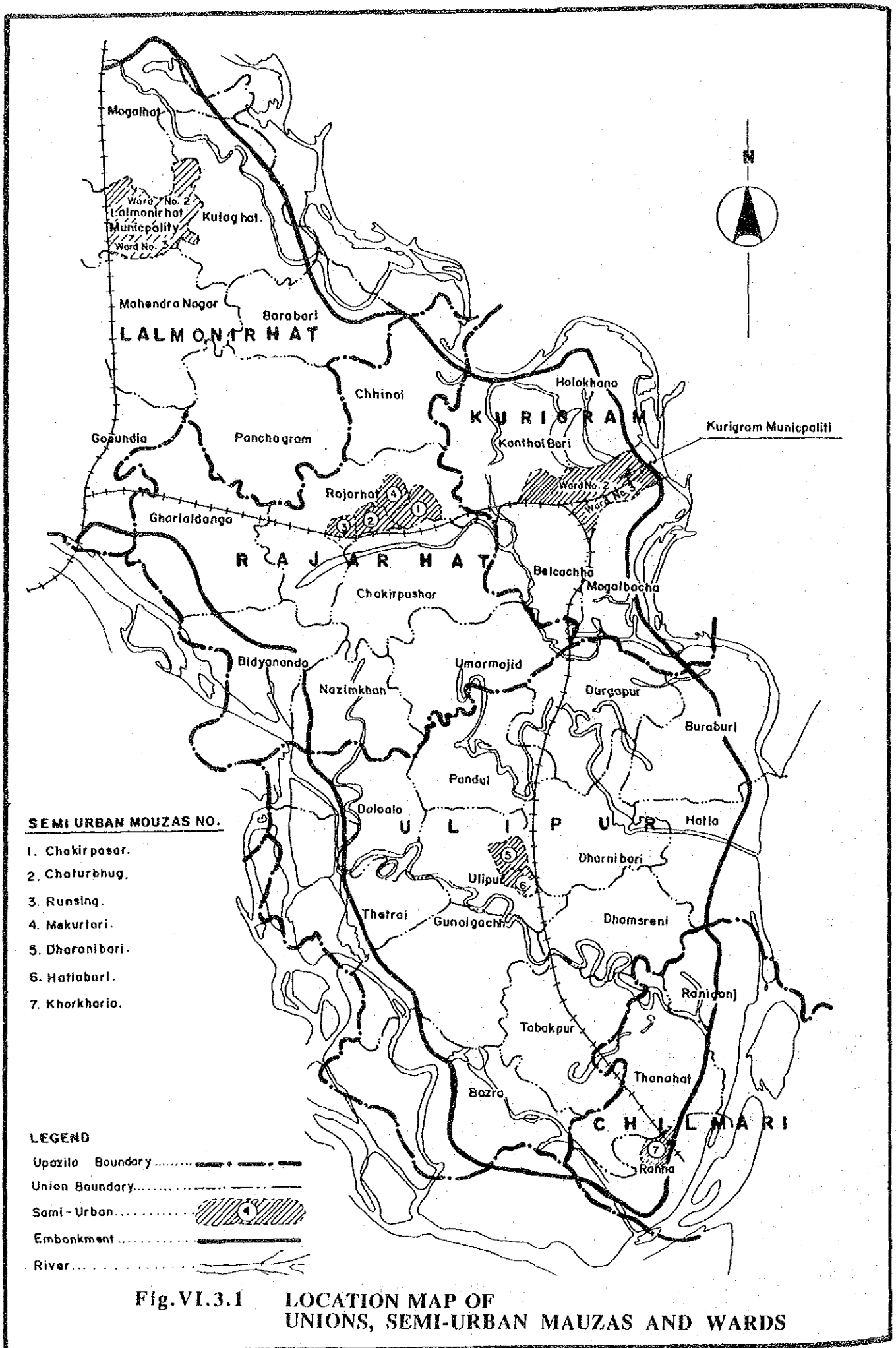


Fig. VI.2.1 SAMPLING METHODOLOGY FOR SOCIO-ECONOMIC BASELINE SURVEY





APPENDIX - VII

***PUBLIC
CONSULTATION
SURVEY***

FEASIBILITY STUDY ON
KURIGRAM IRRIGATION AND FLOOD CONTROL PROJECT
(SOUTH UNIT)

APPENDIX - VII PUBLIC CONSULTATION SURVEY

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APPENDIX-VII PUBLIC CONSULTATION SURVEY

1. General

In order to reflect local needs and suggestions, especially from landless and marginal farmers, into the development plans, the public consultation survey was carried out on a contract basis by the local consultant under supervision of the Study Team. The public consultation survey comprised (1) the questionnaire survey to the project beneficiaries and (2) the discussions with the official and public representatives in the study area. Field survey for the public consultation survey was implemented from August 11 to September 4 in 1992. The collected data and information were compiled as a data base and those were analyzed to clarify the following aspects :

- 1) Nature of flood and drainage problems,
- 2) O & M of the existing FCD project
- 3) Opinions on the envisaged FCD/I project,
- 4) O & M for the envisaged project, and
- 5) Involvement of other agencies for the envisaged project

This appendix presents the analytic results of the public consultation survey.

2. Methodology

The questionnaire survey covered nine (9) beneficiary groups consisting landless, small, medium, large and very large farm households, fishermen, artisans, NGO/cooperative leaders, and local elite. Sampling survey procedure from the selection of mauzas to the sampling of respective beneficiary was shown in Fig. VII.2.1 and summarized as follows :

- 1) The 325 mauzas in the study area were classified into nine(9) areas in terms of flooded conditions and number of households at mauzas same as the socio-economic survey,
- 2) From the above nine kinds of mauzas, the urban and semi-urban mauzas were excluded and respective 25 % of mauzas (85 mauzas in total) were randomly selected (See Fig. VII.2.2),
- 3) One respondent by the respective group beneficiary was randomly selected from the different classes of mauzas. There were some mauzas where the very large farmer, fisherman and NGO/cooperative leader could not be interviewed, hence other group beneficiaries were sampled proportionally.

The questionnaire survey finally covered the following 765 beneficiaries classified into nine (9) groups at the representative 85 mauzas under three different flooded conditions :

Farm Size	Flooded Condition			Total
	F0 (0-30cm)	F1 (30-90cm)	F2&3 (90-180cm)	
I. Nos. of Sampled Mauzas	32	36	17	85
II. Nos. of Sampled				
Landless farmer	42	52	21	115
Small farmer	38	42	23	103
Medium farmer	35	42	24	101
Large farmer	32	43	20	95
Very Large farmer	28	27	8	63
Fishermen	26	25	9	60
Artisan	26	25	13	64
NGO/Cooperative leader	28	29	16	73
Local elite	33	39	19	91
Total	288	324	153	765

The public consultation meetings for the discussion with the public representatives ; NGO/cooperative leader and member including landless cooperative, school teacher, ward female member, bank officer, businessman, etc. ; were held at 31 unions and 5 thanas. The total number of public representatives were 377 at union level and 53 at thana level. The discussion meeting with official representatives ; thana chairman, rural development officer, engineer, agricultural officer, livestock officer, fishery officer, etc. in the respective thana council ; were also held at 5 thanas with 43 attendants in total as shown in Table VII.2.1.

3. Problems and Constraints in Farming

Out of 765 respondents in total, more than 70% of the respondents have farming constraints. There are no significant difference on the shares of respondents facing the farming constraints at the different flooded conditions, i.e. 72% in F0, 73% in F1 and 73% in F2&3 as shown in Table VII.3.1. As regarding nature of farming constraints, insufficient irrigation facilities (61% to the total respondents) are found to be the major problem followed by shortage of farm inputs (35%) and credit (32%) as shown in Table VII.3.2. Flood constraint is limited to 19% in total. Response from landless farmers is low ; only 82% of the total landless farmers answered the question comparing more than two(2) answers per respondent on average. Response on farming constraints is summarized as follows :

Constraints in Farming

Item (Total No. of respondents)	(% to respective respondent)						
	Landless (115)	Small (103)	Medium (101)	Large (95)	Very Large (63)	Others* (288)	Total (765)
Flood	6	21	32	26	33	14	19
Drainage	7	25	40	44	52	21	27
Irrigation	17	75	84	85	95	52	61
Credit	19	64	41	29	11	28	32
Farm Inputs	17	46	41	52	54	30	35
Labour	-	-	2	2	2	-	1
Soil	2	16	8	15	14	5	8
Draught Animal	18	50	28	20	8	22	25
Others	1	5	9	13	16	6	7

Note : Multiple answer

* : Others comprise fishermen, artisans, NGO/cooperative leaders, and local elite.

Importance on farming constrains are varied by farmer's group and the following table indicates three major constraints in descending order by respective group :

Group	No.1	No.2	No.3
Landless	Credit	Drought animal	Irrigation/Farm inputs
Small	Irrigation	Credit	Drought animal
Medium	Irrigation	Credit/Farm inputs	Drainage
Large	Irrigation	Farm inputs	Drainage
Very Large	Irrigation	Farm inputs	Drainage

4. Countermeasures for Increase in Agricultural Productivity

Responses on countermeasures to increase agricultural productivity doesn't vary with the different flooded condition. Irrigation is considered as the most probable measure followed by credit provision and drainage improvement as shown in Table VII.4.1. The measures vary with the groups as shown in Table VII.4.2 and the following table indicates three major answers in descending order by the respective group :

Group	No.1	No.2	No.3
Landless	Credit	Irrigation	Drainage
Small	Irrigation	Credit	Drainage
Medium	Irrigation	Credit	Drainage
Large	Irrigation	Drainage	Credit
Very Large	Irrigation	Drainage	Flood control

5. Response on Flood and Water Logging

5.1 Response on Flood

Activities during flooding period by group are shown in Table VII.5.1. One third of people (33%) live on their homestead with high platform constructed for their safety. Taking shelter on the embankment accounts for around 8% to the total respondents. As regarding thanawise activities, the highest proportion of people in Chilmari take shelter on the embankment. Post flood situation by group is shown in Table VII.5.2. After recession of flood water, most of farmers try their best to go back their cultivation such as T Aman or Rabi crops. The floods force marginal people such as landless, fisherman and artisan to migrate to other places in search of their living or make them on relief.

5.2 Response on Water Logging

Around 37% to the total respondents is facing water logging and those percentages are almost same in all the flooded zones as shown in Table VII.5.3. More than a half of respondents in medium, large, very large and local elite groups is affected by water logging. Major three reasons for water logging presented are (1) siltation of rivers, beels, khals and drainage canals, (2) absence of proper drainage system, (3) lowlying area as shown in Table VII.5.4 and 5.5.

Measures taken by the respondents affected by water logging is shown according to flooded zones and respondent groups in Table VII.5.6 and 5.7 respectively. Around 7% of respondents cut the road or embankment to drain out water. Participation of large and very large farmer groups in the public cut accounts for 14% and 25% respectively which are higher than other groups.

6. Response on Embankment and Regulator

6.1 Embankment and Regulator

Around a half of the respondents is dissatisfied with the present function of embankment and regulators as shown in Table VII.6.1. Dissatisfaction of local elite and medium groups accounts for more than 70% which are higher than other groups. Major reasons for the dissatisfaction concentrate in the function of regulators such as (1) improper regulators' operation, (2) regulators being out of order, and (3) shortage of regulators and vents as shown in Table VII.6.2.

The reasons for the public cuts by group are presented in Table VII.6.3. Drainage of flooding and logging water to protect crops and houses is considered as a main reason. More than 30% of respondents excluding landless and small farmer groups considers that the habitants on the embankment cut for their own convenience. Reasons for breaches on the embankment is shown in Table VII.6.4. River erosion, excessive rainfall, sandy soils of embankment, scratching out grass and cutting of trees on the embankment are considered as the main reasons.

6.2 Habitation on the Embankment

Out of 765 respondents, 22 consisting of 10 landless, two small, four medium, one large, three fishermen, three artisan, one local elite households are habitants on the embankment. Around 9% of the landless respondents is habitants as shown in Table VII.6.5. None of these habitants have no legal right to live on the embankment (See Table VII.6.6). All habitants in landless, fisherman and artisan groups want to get the regal right and consider that there is no damage to the embankment by their habitation (See Table VII.6.7 and 6.8). While other habitants have no interest to get the legal right. All habitants answer that they are doing maintenance care of embankment (See Table VII.6.9).

Major harmful effects considered by the non-habitants are construction of houses by cutting the slope of embankment (67%), soil erosion through cultivation of crops on the embankment (43%), and destruction of glass and tree by cattle grazing (35%) as shown in Table VII.6.10.

7. Response on Irrigation Development at Present Situation

The Table VII.7.2 shows that a high proportion of respondents face a shortage of irrigation water in the Rabi season. Respondents facing a shortage of irrigation water accounts for 56% to the total respondents on average and more than 70% to the small to very large groups. This shortage of water is comparatively high in the flood area of F0 and F1 than F2&3.

At present situation of the Study area, STW and DTW among other types of irrigation facilities are considered as the most probable irrigation method as shown in Table VII.7.2.

The response to STW and DTW accounts for 64% of the total respondents. This is mainly due to absence of development scope for surface water irrigation and their close acquisition of ground water irrigation technology.

Preference of Irrigation Methods at Present Situation

Item (Total No. of respondents)	(% to respective respondent)					Total (477)
	Landless (115)	Small (103)	Medium (101)	Large (95)	Very Large (63)	
STW/DTW	19	74	77	77	87	64
Surface Irrigation	10	43	44	47	48	36
Improvement of existing facilities	3	13	11	14	14	10
Others	3	8	7	11	6	7

Note : Multiple answer

The farmers put the irrigation priority to HYV Boro (62% response) followed by wheat (52%) and HYV Aus (34%) as shown in Table VII.7.3 and summarized as follows :

Priority Crops for Irrigation

Item (Total No. of respondents)	(% to respective respondent)					Total (477)
	Landless (115)	Small (103)	Medium (101)	Large (95)	Very Large (63)	
Boro (HYV)	17	72	76	81	81	62
Boro(Local)	0	0	6	2	3	2
Wheat	13	50	61	71	83	52
Aus	10	41	41	44	43	34
Potato	5	15	23	33	38	21
Vegetable	3	9	13	16	17	11
Others	8	16	22	23	27	18

Note : Multiple answer

8. Response on Envisaged FCD/I Development Plan

The JICA study team proposed the following new irrigation, flood control and drainage development plans on the questionnaire through the public consultation survey :

Surface Irrigation Development Plan

- a. Irrigation sluice on the right bank of the Dharla river instead of construction of Dharla barrage and pumping plant.
- b. Irrigation by LLPs from existing drainage canals to be rehabilitated and used as irrigation canals.
- c. Large scale irrigation to provide irrigation water from the beel both for irrigation and fishing.

Flood Control and Drainage Development Plan

- d. Re-construction and improvement of existing regulators.
- e. Heightening / reshaping of existing embankment including repair of public cut.

The above three irrigation development components were basically supported by the respondents. Especially, the irrigation from beel is most appreciated by the respondents reflecting favourable views of landless farmers and fishermen. Regarding flood control and drainage development plans, the regulators' improvement is basically approved, while the embankment improvement is denied by landless farmers of which around 9% are habitants on the embankment. The survey result is as shown in Table VII.8.1 to 8.5 and summarized as follows :

Support Response to Envisaged FCD/I Development Plan

Item (Total No. of respondents)	(% to respective respondent)						
	Landless (115)	Small (103)	Medium (101)	Large (95)	Very Large (63)	Others (288)	Total (765)
1. Irrigation Sluice	46	68	70	69	60	60	62
2. LLPs Irrigation	9	93	84	79	81	62	65
3. Irrigation from Beel	61	78	73	78	57	64	68
4. Regulator Improve	46	61	75	84	65	49	59
5. Embankment Improve	8	61	81	43	33	45	45

Note : Multiple answer

Main support reasons for the above components of surface irrigation development are decrease in irrigation cost and increase in land fertility (37%), increase in cropping intensity and HYV paddy cultivation (26%), and increase in employment opportunity (12%). On the other hand, main reasons for disagreement are summarized as follows (See Table VII.8.6) :

- 1) Opposition of the respondents, who are using silted khals and beels as their cropland, to re-excavation of these places (8% to the total respondents),
- 2) Many land cannot be irrigated because of topographical difference and reasons (7%) , and
- 3) A large number of farm lands cannot be irrigated because of their long distance from the khals and beels (7%).

9. Response on Organization and Coordination

The organization set-up will be indispensable for the O&M of proposed surface water irrigation in the future. While the favourable response to participation in cooperative is unsatisfactorily low at 47% to the total respondents. Respondents who will not participate in the cooperatives for better O&M activities account for 28% in total, around 50% in the medium, large and very large groups as follows :

Response on Cooperative Activity for O&M of Surface Irrigation

Item (Total No. of respondents)	(% to respective respondent)						
	Landless (115)	Small (103)	Medium (101)	Large (95)	Very Large (63)	Others (288)	Total (765)
Support response	16	58	50	48	51	53	47
Negative response	0	37	50	52	49	16	28

Note : Details as shown in Table VII.9.1 and 9.2.

The respondents were asked on an idea making some contribution through the cooperatives for better O&M of surface water. The result is shown in Table VII.9.3. The support respondents is limited to 43% in total, while more than 60% in the small, medium, large and very large groups.

Main reasons for non-participation in irrigation cooperatives (see Table VII.9.4) are prospective irregular distribution of irrigation water (16% to the total respondents), lack of confidence in the cooperatives (15%), and cooperatives dominated by influential people (14%). Main reasons for the negative response to contribute through the cooperatives for irrigation O&M (see Table VII.9.5) are cooperatives dominated by influential people (40%), nepotism and corruption of the cooperative managers (37%), and lack of proper accounts in the cooperatives (29%). The negative answers concentrate on the mismanagement and lack of confidence in the cooperatives.

10. Focus Group Discussion

The subjects on flood and water logging problems, the existing FCD facilities, the proposed FCD/I projects, and mobilization of local resources for O&M of the proposed project were discussed with official and public representatives in the Study area. The opinions and suggestions presented at thana level are arranged as shown in Table 10.1 to 10.9 on the basis of the minutes of discussions. The main suggestion points from the local representatives may be summarized as follows :

10.1 Suggestions for Improvement of the Existing FCD Facilities

- 1) Desilting and re-excavation of the existing drainage channels and beels, and construction of more drainage channels according to the requirement of the area,
- 2) Construction of sufficient linkage channels,
- 3) Use of pumps for draining out the stagnant water,
- 4) Increase of the number of regulators and number of vents in the existing regulators,
- 5) Proper and regular repair of the embankment with adequate materials (not use of sandy soils),
- 6) Immediate and quick repair of the public cuts and breaches by BWDB,
- 7) Plantation of both sides of the embankment,
- 8) Regular repair and maintenance of the existing regulators,
- 9) Involvement of Thana and Union Parishads in maintenance of the embankment.
- 10) Arrangement for organizing a committee consisting BWDB and local representatives for proper maintenance of the facilities, and
- 11) Increase in fund allocation for improvement of maintenance works.

10.2 Suggestions on the Proposed FCD/I Project

10.2.1 Flood control

- 1) Proper maintenance work is more essential than raising the height of the embankment. Breaches are serious. Sandy soils should not be used for repairing the breaches.
- 2) Height of the embankment should be raised, where necessary, to the extent that can resist the flood water level of 1988. (Chilmari, Officer)
- 3) River training work may be needed.
- 4) For proper maintenance of the embankment, local authorities should be involved with BWDB.
- 5) Monitoring of the embankment should be entrusted to the Union Parishad. At present local administration can not play any role in the repair and maintenance of the embankment.
- 6) Close coordination between BWDB and local authorities will be required for proper maintenance of the embankment.
- 7) Tree plantation on the embankment is hampering for the execution of the maintenance work.

10.2.2 Drainage improvement

- 1) The proposed desilting works of the existing drainage channels are appreciated very much. Local administration should be involved in these desilting works.
- 2) Linkage channels should be constructed to drain out the stagnant water in the area.
- 3) The silted-up channels are being used as cropland by the local people. Local administration's help is therefore essential for the re-excavation of these canals.
- 4) Rehabilitation of the existing regulators will be appreciated very much. The number of regulators and the number of vents should be increased.
- 5) For proper O&M of the regulators, regular committee should be formed with Union Parishad and local representatives under the supervision of BWDB.
- 6) Chilmari and Ratnai regulators should be repaired with increased vents.

10.2.3 Irrigation development

- 1) The proposed surface water irrigation with use of LLPs is very much appreciated, because
 - the surface water is iron-free while the ground water is with high iron content;
 - surface irrigation water will be less costly than the ground water irrigation; and
 - during the peak months of dry season water level goes down and ground water supply drastically becomes low.

- 2) Supply of spare parts for LLPs may be the problem. Credit facilities are also required for purchase of the spare parts, because about 60% of the people have no savings.
- 3) The extraction of water from the Dharla may cause the silting-up the river beds and dredging of the river may become essential.
- 4) The water availability of the Dharla river during the dry season is scarce. If water is available, the project will be successful. Possibility of construction of barrage in the territory of India should not be ignored.
- 5) Water reservoir should be considered within the command area for water storage.
- 6) Independent irrigation society may be formed with the water users. BWDB and DAE can take responsibility for forming such society with the help of union Parishad.
- 7) BRDB/BADC should distribute LLPs to the marginal and small farmers on a rental basis.
- 8) Large farmers may not be interested in irrigation because they can not get water charge from the tenant farmers in time. Market prices at the harvest season are generally low.
- 9) Coordination between BWDB and other related agencies, i.e. DAE, DOF, BRDB and LGED will be needed to support the farmers and the landless groups. But coordination at the national level is indispensable for the execution of proper coordination at the field level.
- 10) Demonstration farm will be needed. The efficiency of the demonstration scheme will be accelerated involving Union Parishad leadership.
- 11) Coordination committee comprising BWDB, DAE, DOF, BRDB and LGED should be organized for proper implementation, operation and maintenance of the proposed FCD/I project.
- 12) Beneficiary groups can be organized under the guidance of BRDB.
- 13) An independent irrigation society under one LLP may be formed with the water users of the locality. The society may get loan from credit agencies with little interest.
- 14) Demonstration can be taken up in this locality to identify and define the pattern of the involvement and coordination among the Thana officials of the concerned agencies.

10.2.4 Mobilization of local resources for O&M of the proposed project

- 1) Most of the people lead their lives below poverty level. Therefore, implementation and maintenance works with voluntary labour does not work.
- 2) Mobilization of any local fund may be very difficult. Only the people who will directly benefit by the irrigation may contribute some amount in proportion to the benefits to be received by them.
- 3) Beneficiaries of this locality can contribute some amount to build funds that can be used for operation and maintenance of the project components as an "Irrigation charges".

**Table VII.2.1 Focus Group Discussions at Different Levels under
Public Consultation Survey**

Particulars/Thana	Kurigram	Rajarhat	Ulipur	Chilmari	Lalmonirhat	Total
I. Officials at Thana Level						
- No. of Meetings	1	1	1	1	1	5
- No. of Officials Present	8	10	9	9	7	43
II. Local Representatives at Thana Level						
- No. of Meetings	1	1	1	1	1	5
- No. of Representatives Present	9	14	15	10	5	53
III. Local Representatives at Union Level						
- Names of Union Covered	Belgacha Holokhana Kanthalbari Mogal Bacha	Bidyananda Chakir Pashar Ghariaidanga Nazimkhan Rajarhat Umar Majid Chhinai	Dhamsreni Buraburi Daldalia Dharanibari Durgapur Gunaigacha, Hatia Pundul, Tabakpur Theitai, Ulipur	Ramna Ranigonj Thanahat	Barabari Gokunda Kulaghat Mahendranagar Mogalhat Panchagram	31
- No. of Meetings Held	4	7	11	3	6	31
- No. of Representatives Present	44	82	122	23	106	377
Total						
- No. of Meetings Held	6	9	13	5	8	41
- No. of Persons Present	61	106	146	42	118	473

Table VII.3.1 Response on Facing Constraints in Farming by Group at Different Flooded Conditions

Group	F0		F1		F2&3		Total	
	No.	%	No.	%	No.	%	No.	%
Landless	9 (42)	21	11 (52)	21	8 (21)	38	28 (115)	24
Small	36 (38)	95	41 (42)	98	20 (23)	87	97 (103)	94
Medium	34 (35)	97	42 (42)	100	20 (24)	83	96 (101)	95
Large	32 (32)	100	42 (43)	98	18 (20)	90	92 (95)	97
Very Large	28 (28)	100	25 (27)	93	8 (8)	100	61 (63)	97
Sub-total	139 (175)	79	161 (206)	78	74 (96)	77	374 (477)	78
Fishermen	4 (26)	15	7 (25)	28	2 (9)	22	13 (60)	22
Artisan	9 (26)	35	7 (25)	28	4 (13)	31	20 (64)	31
Coop/NGO Member	21 (28)	75	25 (29)	86	15 (16)	94	61 (73)	84
Local Elite	33 (33)	100	37 (39)	95	18 (19)	95	88 (91)	97
Sub-total	63 (87)	72	69 (93)	74	37 (48)	77	169 (228)	74
Total	206 (288)	72	237 (324)	73	113 (153)	74	556 (765)	73

Note : Figures in parenthesis indicate the total number of respondents in the respective group
Source : Public Consultation Survey, JICA

Table VII.3.2 Response on Kinds of Farming Constraints By Group

Item (Total No. of Respondents)	Land-less	Small	Medium	Large	Very Large	Fisher-man	Artisan	NGO Co-op	Local Elite	Total
	(115)	(103)	(101)	(95)	(63)	(60)	(64)	(73)	(91)	(765)
Flood	No. 7 (%) (6)	22 (21)	32 (32)	25 (26)	21 (33)	3 (5)	2 (3)	10 (14)	25 (27)	147 (19)
Drainage	No. 8 (%) (7)	26 (25)	40 (40)	42 (44)	38 (60)	3 (5)	3 (5)	16 (22)	38 (42)	209 (27)
Irrigation	No. 19 (%) (17)	77 (75)	84 (83)	81 (85)	76 (121)	8 (13)	15 (23)	52 (71)	76 (84)	467 (61)
Credit	No. 22 (%) (19)	66 (64)	41 (41)	28 (29)	19 (30)	9 (15)	15 (23)	38 (52)	19 (21)	245 (32)
Farm Inputs	No. 14 (%) (12)	47 (46)	41 (41)	49 (52)	44 (70)	4 (7)	7 (11)	30 (41)	44 (48)	269 (35)
Labour	No. 0 (%) (0)	0 (0)	2 (2)	2 (2)	1 (2)	0 (0)	0 (0)	0 (0)	1 (1)	6 (1)
Soil	No. 2 (%) (2)	10 (10)	8 (8)	14 (15)	9 (14)	1 (2)	1 (2)	3 (4)	10 (11)	58 (8)
Draught Animal	No. 21 (%) (18)	52 (50)	28 (28)	19 (20)	5 (8)	7 (12)	11 (17)	23 (32)	22 (24)	188 (25)
Others	No. 1 (%) (1)	5 (5)	9 (9)	12 (13)	10 (16)	0	1 (2)	6 (8)	9 (10)	53 (7)
Total	No. 94	305	285	272	223	35	55	178	244	1,642

Note : Percentages indicate that the share of respondents having specific constraints to the total number of respective group
Source : Public Consultation Survey, JICA

Table VII.4.1 Response on Countermeasures to Increase Agricultural Productivity at Different Flooded Conditions

Item (Total No. of Respondents)	F0(288)		F1(324)		F2&3(153)		Total(765)	
	No.	%	No.	%	No.	%	No.	%
Flood control	49	17	75	23	24	16	148	19
Drainage	77	27	96	30	39	25	212	28
Irrigation	175	61	211	65	97	63	483	63
Credit	118	41	127	39	64	42	309	40
Others	96	33	81	25	47	31	224	29
Total	515		590		271		1,376	

Source : Public Consultation Survey, JICA

Table VII.4.2 Response on Countermeasures to Increase Agricultural Productivity by Group

Item (Total No. of Respondents)	Farmers						Fisher-man	Artisan	NGO Co-op	Local Elite	Total
	Land-less	Small	Medium	Large	Very Large	Total					
	(115)	(103)	(101)	(95)	(63)	(477)	(60)	(64)	(73)	(91)	(765)
Flood Control	No. 6 (%) (5)	25 (24)	30 (30)	24 (25)	19 (30)	104 (22)	7 (12)	8 (13)	9 (12)	25 (27)	153 (20)
Drainage	No. 8 (%) (7)	28 (27)	37 (37)	43 (45)	35 (56)	151 (32)	3 (5)	4 (6)	17 (23)	37 (41)	212 (28)
Irrigation	No. 20 (%) (17)	83 (81)	85 (84)	81 (85)	59 (94)	328 (69)	10 (17)	17 (27)	53 (73)	76 (84)	484 (63)
Credit	No. 23 (%) (20)	80 (78)	52 (51)	34 (36)	14 (22)	203 (43)	9 (15)	17 (27)	44 (60)	36 (40)	309 (40)
Others	No. 5 (%) (4)	37 (36)	37 (37)	45 (47)	26 (41)	150 (31)	3 (5)	13 (20)	23 (32)	35 (38)	224 (29)
Total	No. 62	253	241	227	153	936	32	59	146	209	1,382

Source : Public Consultation Survey, JICA

Table VII.5.1 Response on Countermeasures During Flooding Period by Group

No.	Measures Taken	LL n=115		S n=103		M n=101		L n=95		VL n=63		FM n=60		AS n=64		Co-op/NGO n=73		LE n=91		Total n=765	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
01	Take Shelter on the embankment	16	13.9	14	13.6	6	5.9	9	9.5	8	12.7	13	21.7	11	17.2	3	4.1	6	6.6	86	11.2
02	Reside on the high platforms made on the homestead and makes shafts for movement	37	32.2	36	35.0	27	26.7	34	35.8	27	42.9	21	35.0	36	56.3	18	24.7	19	20.9	255	33.3
03	Take Shelter in the school or Madrasa building and/or at the high place	5	4.3	6	5.8	7	6.9	7	7.4	4	6.3	5	8.3	8	12.5	6	8.2	9	9.9	57	7.5
04	Take shelter in the houses of the neighbours at high place	7	6.1	6	5.8	-	-	-	-	-	-	-	-	5	7.8	6	8.2	7	7.7	31	4.1
05	Keep the cattleheads and poultry birds on the roads or some high places	-	-	-	-	7	6.9	3	3.2	3	4.8	-	-	-	-	2	2.7	3	3.3	18	2.4
06	Shift the families to the house of the relatives	-	-	5	4.9	4	4.0	6	6.3	5	7.9	5	8.3	3	4.7	4	5.5	7	7.7	39	5.1
07	Area not affected by flood	3	2.6	5	4.9	7	6.9	3	3.2	3	4.8	7	11.7	3	4.7	2	2.7	2	2.2	35	4.6
08	Shift the stock of paddy/rice	-	-	-	-	5	5.0	9	9.5	15	23.8	-	-	-	-	-	-	-	-	29	3.8
09	Make "Dingi" (light boat) and/or shafts	-	-	-	-	-	-	-	-	-	-	6	10.0	-	-	-	-	-	-	6	0.8
10	Try to collect and stock fuel for cooking and hays for the cattle	-	-	-	-	-	-	2	2.1	3	4.8	-	-	-	-	2	2.7	2	2.2	9	1.2
11	Take shelter on the road	13	11.3	7	6.8	3	3.0	2	2.1	3	4.8	-	-	-	-	-	-	-	-	28	3.7
12	Prepare seed bed on the highland of the homestead	-	-	-	-	-	-	5	5.3	5	7.9	-	-	-	-	1	1.4	1	1.1	12	1.6
13	Reside in own house, but remain alert about flood water	-	-	3	2.9	15	14.9	13	13.7	11	17.5	-	-	-	-	6	8.2	3	3.3	51	6.7
14	Our Dwelling house is above the flood level	-	-	11	10.7	18	17.8	23	24.2	29	46.0	-	-	4	6.3	11	15.1	18	19.8	114	14.9
15	Stay on the platform of bedstead on the road	2	1.7	1	1.0	3	3.0	-	-	-	-	-	-	-	-	-	-	-	-	6	0.8

Note : LL=Landless, S=Small, M=Medium, L=Large Farmer, VL=Very Large, FM=Fisherman, AS=Artisan, LE=Local Elite.
Sources : Public Consultation Survey, JICA

Table VII.5.2 Response on Countermeasures After Recession of Flood Water by Group

No.	Measures Taken	LL n=115		S n=103		M n=101		L n=95		VL n=63		FM n=60		AS n=64		Co-op/NGO n=73		LE n=91		Total n=765	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
01	Sow T. Amon if season permits and seedlings are available. If not go for cultivation of Rabi crops such as Wheat, Mustard, Pulses, Peper etc.	-	-	39	37.9	81	80.2	70	73.7	48	76.2	3	5.0	-	-	29	39.7	31	34.1	301	39.3
02	Flood does not affect the area	5	4.3	13	12.6	3	3.0	1	1.1	2	3.2	1	1.7	-	-	11	15.1	13	14.3	49	6.4
03	No action is necessary to be taken	16	13.9	10	9.7	13	12.9	12	12.6	11	17.5	3	5.0	-	-	7	9.6	7	7.7	79	10.3
04	Catch fish and sell in the market	-	-	-	-	-	-	-	-	-	-	27	45.0	-	-	-	-	-	-	27	3.5
05	Migrate from the area to other Places in search of employment	36	31.3	-	-	-	-	-	-	-	-	5	8.3	15	23.4	-	-	-	-	56	7.3
06	Mortgage out land	-	-	10	9.7	6	5.9	-	-	-	-	2	3.3	2	3.1	-	-	-	-	20	2.6
07	Sell the cows/bullocks/goats	2	1.7	11	10.7	6	5.9	-	-	-	-	-	-	-	-	2	2.7	2	2.2	23	3.0
08	Borrow money to produce Rabi crops or Boro paddy	-	-	14	13.6	9	8.9	-	-	-	-	3	5.0	-	-	3	4.1	-	-	29	3.8
09	Repair the damaged house with borrowed fund	-	-	-	-	4	4.0	8	8.4	7	11.1	-	-	-	-	-	-	2	2.2	21	2.7
10	Depend on business Rather than going for cultivation work	-	-	-	-	-	-	-	-	-	-	-	-	6	9.4	2	2.7	-	-	8	1.0
11	Depend on relief	15	13.0	-	-	-	-	-	-	-	-	3	5.0	5	7.8	-	-	-	-	23	3.0
12	Go for cultivation of land if seeds and/or seedlings can be procured	-	-	5	4.9	8	7.9	12	12.6	16	25.4	7	11.7	4	6.3	-	-	2	2.2	54	7.1
13	Go for working as daily labour	10	8.7	-	-	-	-	-	-	-	-	-	-	1	1.6	-	-	-	-	11	1.4
14	Have no cultivable land	-	-	-	-	-	-	-	-	-	-	4	6.7	5	7.8	-	-	-	-	9	1.2
15	Leave some plots of land fallow and cultivate the remaining	-	-	6	5.8	7	6.9	-	-	-	-	-	-	-	-	-	-	-	-	13	1.7
16	Impossible to cultivate land a new	-	-	8	7.8	-	-	-	-	-	-	-	-	-	-	1	1.4	5	5.5	14	1.8
17	Depend on borrowing if relief is not received	9	7.8	-	-	-	-	-	-	-	-	-	-	5	7.8	-	-	-	-	14	1.8
18	Sell the paddy, Tree, Bambo etc.	-	-	-	-	2	2.0	3	3.2	5	7.9	-	-	-	-	-	-	-	-	10	1.3
19	Advance sell of labour	1	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.1
20	Sell the Duck, Hen	-	-	-	-	-	-	-	-	-	-	-	-	2	3.1	-	-	-	-	2	0.3
21	Sell the product of Handicrafts	1	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.1

Note : LL=Landless, S=Small, M=Medium, L=Large Farmer, VL=Very Large, FM=Fisherman, AS=Artisan, LE=Local Elite.
Sources : Public Consultation Survey, JICA

Table VII.5.3 Response on Facing Constraints Due to Water Logging by Group at Different Flooded Conditions

Categories of Beneficiaries	F0(288)		F1(324)		F2&3(153)		Total(765)	
	No.	%	No.	%	No.	%	No.	%
Landless	0	0	5	10	5	24	10	9
Small	13	34	14	33	7	30	34	33
Medium	20	57	22	52	13	54	55	55
Large	22	69	29	67	12	60	63	66
Very Large	19	68	20	74	3	38	42	67
Sub-total	74	42	90	44	40	42	204	43
Fishermen	2	8	0	0	2	22	4	7
Artisan	3	12	0	0	1	8	4	6
Co-operative/NGO	10	36	7	24	6	38	23	32
Local Elite	17	52	20	51	7	37	44	48
Sub-total	30	34	27	29	14	29	71	31
Total	106	37	117	36	56	37	279	37

Source : Public Consultation survey, JICA

Table VII.5.4 Reasons for Water Logging at Different Flooded Conditions

Reasons	F0(288)		F1(324)		F2&3(153)		Total(765)	
	No.	%	No.	%	No.	%	No.	%
I Rivers have been silted up	28	10	39	12	9	6	76	10
II Absence of link-Canals	23	8	27	8	13	9	63	8
III Regulators not functioning Properly	17	6	21	7	7	5	45	6
IV Long time required in the Drainage of Water	15	5	19	6	6	4	40	5
V Absence of Proper Drainage System	38	13	33	10	17	11	88	12
VI Inadequacy of vents in the Regulators	19	7	23	7	8	5	50	7
VII Construction of roads in an Unplanned Way	16	6	21	7	5	3	42	6
VIII Absence of Rings/Culverts in the places where necessary	18	6	17	5	6	4	41	5
IX Silting up of Beels, Khals and Drainage Channels	31	11	24	7	19	12	74	10
X Heavy Showers	17	6	13	4	7	5	37	5
XI Lowlying Area	33	12	41	13	15	10	89	12
XII Obstruction Created by the embankment in the normal Drainage of Water	0	0	7	2	3	2	10	1
XIII Water Logging does not occur	39	14	35	11	21	14	95	12

Source : Public Consultation Survey, JICA