# RURAL COMMUNITY AND AGRICULTURE IN BANGLADESH: AN ESSAY ON THREE SELECTED VILLAGES

PART ONE

Yoshimi Komoguchi

## CHAPTER I

## FRAMEWORK OF THE STUDY

The objective of this study is to describe and analyze selected rural communities of Bangladesh with specific reference to the variations, both geographical and functional, found in their agricultural activities. In order to meet this objective, research has focussed on the following three aspects: (1) pattern of land uses and their associations (2) labour and occupational specialization, (3) landholdings and tenantships. Intensive fieldwork was undertaken in the following three villages: (1) South Rampur village in Comilla District, (2) Palas village in Dacca District, and (3) Chandipur village in Kushtia District (Fig. I-1). Data obtained from the three study villages have been compared in order to delineate some crucial aspects of those rural socio-economic systems in which subsistence elements still loom large.

The criteria that differentiate the three village communities consist of factors which are expected to influence the variability of agricultural activities. These are (1) the ecological setting, (2) the technology of cultivation, such as the intensity of seasonal crop specialization and rotation, (3) the availability of publicly financed agricultural development programs, and (4) the degree of influence of regional urbanization and industrialization. In spite of these involved factors, the three villages studied, rather than simply being different communities, exhibit some of the major types of change occurring in the rural areas of Bangladesh.

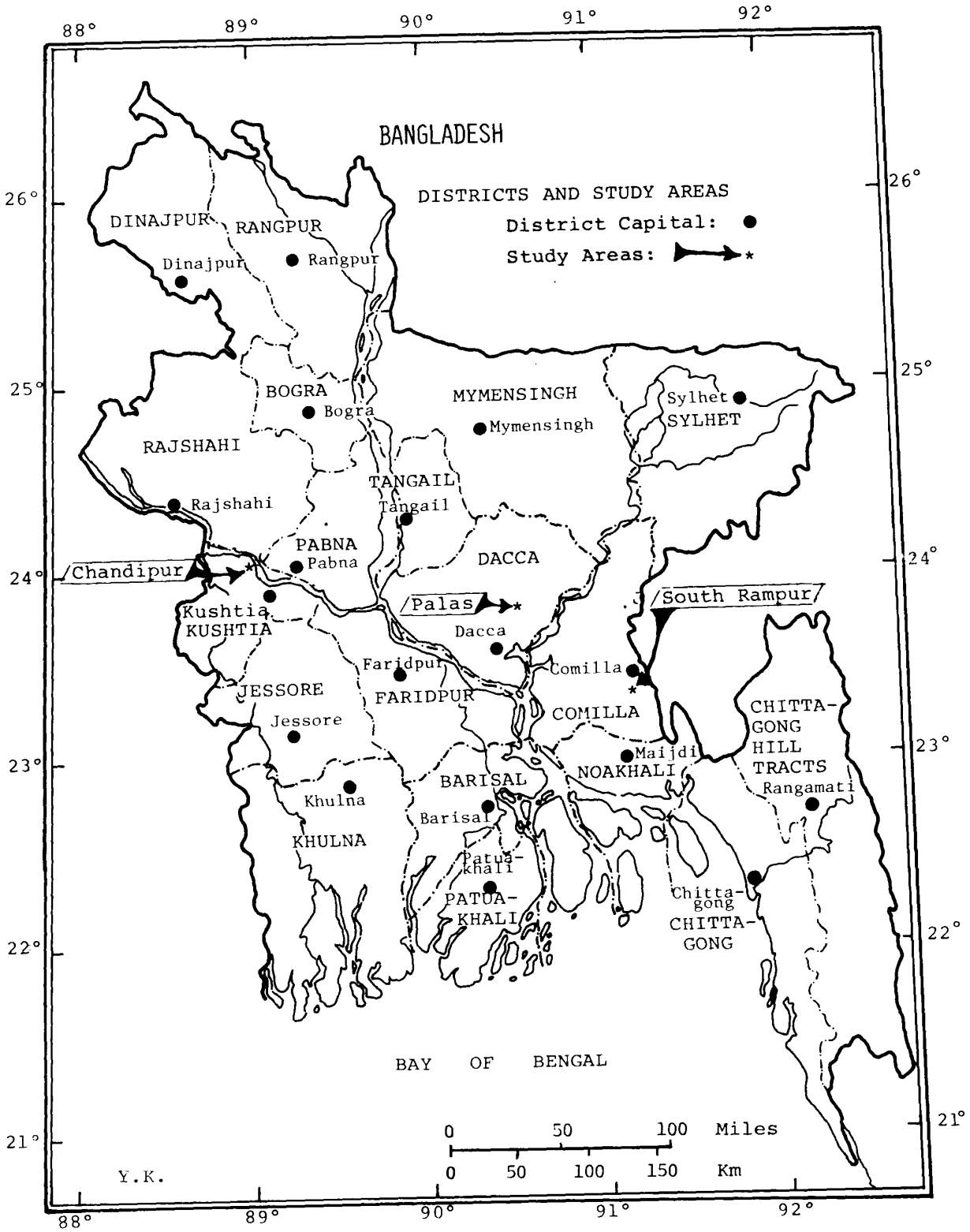
BANGLADESH
DISTRICTS AND STUDY AREAS
District Capital:
Study Areas:
88°
89°
90°
91°
92°
26°
25°
24°
23°
22°
21°
DINAJPUR
RANGPUR
Dinajpur
Rangpur
BOGRA
Bogra
MYMENSINGH
Mymensingh
Sylhet
SYLHET
RAJSHAHI
Rajshahi
TANGAIL
Tangail
PABNA
Pabna
DACCA
Chandipur
Palas
South Rampur
Kushtia
KUSHTIA
Dacca
Faridpur
FARIDPUR
Comilla
COMILLA
JESSORE
Jessore
Maijdi
NOAKHALI
CHITTA-
GONG
HILL
TRACTS
Rangamati
BARISAL
Barisal
Khulna
KHULNA
Patua-
khali
PATUA-
KHALI
Chitta-
gong
CHITTA-
GONG
BAY OF BENGAL
0 50 100 Miles
0 50 100 150 Km
Y.K.

Figure I-1

Some of the characteristics of the problems involved in this study and the procedures to analyze them are discussed here. Regarding land uses and their association, the ecological setting is approached primarily through an analysis of the micro-ecology of rice terraces. These have been examined, first, in relation to the physical elements such as climate, physiography (especially elevation and slope), and relative location from water sources; and, second, in relation to technological factors, such as patterns of crop-breeding and selection, manuring, weeding, and water supply and control.

Water supply and control especially is one of the key factors in the cultivation of wet-paddy, the dominant crop in Bangladesh. This general proposition may appear to be self-evident, but, it also conceals some complexities because the water regime of a paddy terrace is a matter of some complexity and delicacy.[1] Therefore, it has been necessary to determine the extent to which terraces at various levels retain a sufficient or desirable volume of water, and to discern how effectively different types of rice[2] and other crops are cultivated in accordance with the available water supply.

In two of the three study villages, the introduction of new irrigation systems has considerably altered the emphasis on "traditional" practices of crop selection and land-use as well as their rotation. Various patterns of assigning different types of rice to specific plots of land, to crop rotations, and to cropping seasons must not be thought of as static or unchangeable, at least at present. What differentiates regions and even villages is the relative emphasis placed upon a particular type, or a particular combination of types, of crops. For instance, in any region, or in any village, the entire gamut of different "types of rice" can be usually found.

---

[1]Clifford Geertz, Agricultural Involution: the Process of Ecological Change in Indonesia (Berkeley: University of California Press, 1966), p. 31. See also D. H. Grist, Rice (London: Longmans Green, 1959), pp. 28-29.

[2]The term "type of rice" as used here does not mean a variety of rice plant. A "type" is a number of varieties of rice classed together because of their common cropping season.

In addition, it must be stressed that the gross production and net production per unit of land for particular types of rice and other crops vary from place to place. These variations have been compared and accounted for by benefit-cost analyses of rice and other crops. The analyses help clarify those factors which bring about specialized land utilization and different combinations of crops. It goes without saying, however, that benefit-cost analysis cannot explain all the decisions actually made by the respective cultivators, and that an analysis itself cannot go beyond the range of alternatives which are immediately evident to the cultivators and directly observed by the author.

Problems closely related to those of land uses and their associations are those of the operational aspects of agricultural activities: that is, how has the necessary agricultural labor force been managed? More specifically, to what extent have the available work members in individual households been involved as part of the actual labor force? In answering this question, three major factors have been taken into consideration: (1) size of landholdings in individual households, (2) availability of agricultural laborers, and (3) availability of non-agricultural occupations for the villagers in or around the survey villages for which regional urbanization and industrialization are assumed to be responsible. Thus, the author analyzed the distribution of landholdings among households and occupational structures in the study villages by examining the roles of individual working members in their families, which are then classified into several categories. The author also has analyzed labor employment and its conditions, taking into account the variation of number of hired-man-days per month through the year, and the variation of daily wages in these monthly averages, both of which rhythms are assumed to coincide with the seasonality of land uses.

As expected, the size and/or amount of means of production such as land, labor, agricultural implements, and livestock (especially bullocks as draft power) were unevenly distributed among households in a given village. Accordingly, each household would try to utilize its available resources as effectively as possible in accordance with these differences. Representative ways for the effective utilization of available human and material

resources are seen in the participation in some kinds of tenancy, e.g., barge (share-cropping), zirat (cash-tenancy), bandak (mortgage tenancy), and kaikarashi (quasi-mortgage tenancy). All of these tenancy transactions result in the transfer of rights of cultivation. In addition, the last two systems bring about money flows from mohajan (money lenders) to their borrowers (title owners of involved land). A central issue in these tenantships is to examine how private and public modes of redistributing and/or financing factors necessary for cultivation are utilized by individual rural families of differing socio-economic status.

This line of inquiry, together with that of the labor management already mentioned, has made it possible not only to see ways in which individual villagers make ends meet as agriculturalists, but also to describe agricultural productive systems which integrate independent factors of cultivation on wider regional scales. Moreover, it helps clarify two levels at which the processes of industrialization and urbanization can influence rural agricultural activities. Proximity to cities and towns, and the establishment of factories in erstwhile agricultural regions, enable individual villagers to turn to new sources of income and thereby necessitate the re-structuring of systematic aspects of local agricultural activities. One of the three surveyed villages, in and around which several factories have recently been established, is an exemplary case to illustrate this point. Granted that public agricultural development programs, industrialization, and urbanization do not necessarily bring about a so-called immediate "break-through" for a developing economy, the author is convinced that subsistence-oriented rural economies do not necessarily mean static and homogeneous economies but are quite susceptible to new opportunities and are capable of diversification.

# CHAPTER II

# THE STUDY AREAS

## Physical Conditions for Agriculture in Bangladesh

The morphological units of Bangladesh are classified into three major units: Tertiary hills, Pleistocene terraces, and Recent alluvial plains (Fig. II-1). According to Rizvi,[1] these tracts are further subdivided into specific areas as follows:

| | |
|---|---|
| Tertiary Hills: | (a) Chittagong Hills,<br>(b) Tripura Hills; |
| Pleistocene Terraces: | (a) Barind,<br>(b) Madhpur Jungle,<br>(c) Minor Terraces; |
| Recent Alluvial Plains: | (a) Tripura Surface,<br>(b) Piedmont Alluvial Plains,<br>(c) Ganges-Brahmamaputra-Meghna Flood Plains,<br>(d) Deltaic Plains (including Tidal Plains). |

The major part of Bangladesh is alluvial plains, consisting of Pleistocene terraces and recent alluvial plains, filled with Quaternary sediments deposited by the Ganges, the Brahmaputra, the Meghna and their numerous tributaries and distributaries. The plains have moderate relief with several terraces or slopes, and form the different physiographic units. Within the local physiographic units, the plains are criss-crossed with numerous natural water channels (khal) which serve sometimes as drainage courses and as sources of water for nearby crop-land during the dry season. However, these channels do not always contain running water, depending upon the over-all water conditions in a given area.

---

[1] Ali Rizvi, "Comparative Physiography of the Lower Ganges and Lower Mississippi Valleys" (unpublished Ph.D Dissertation, Department of Geography, Louisiana State University, 1955).

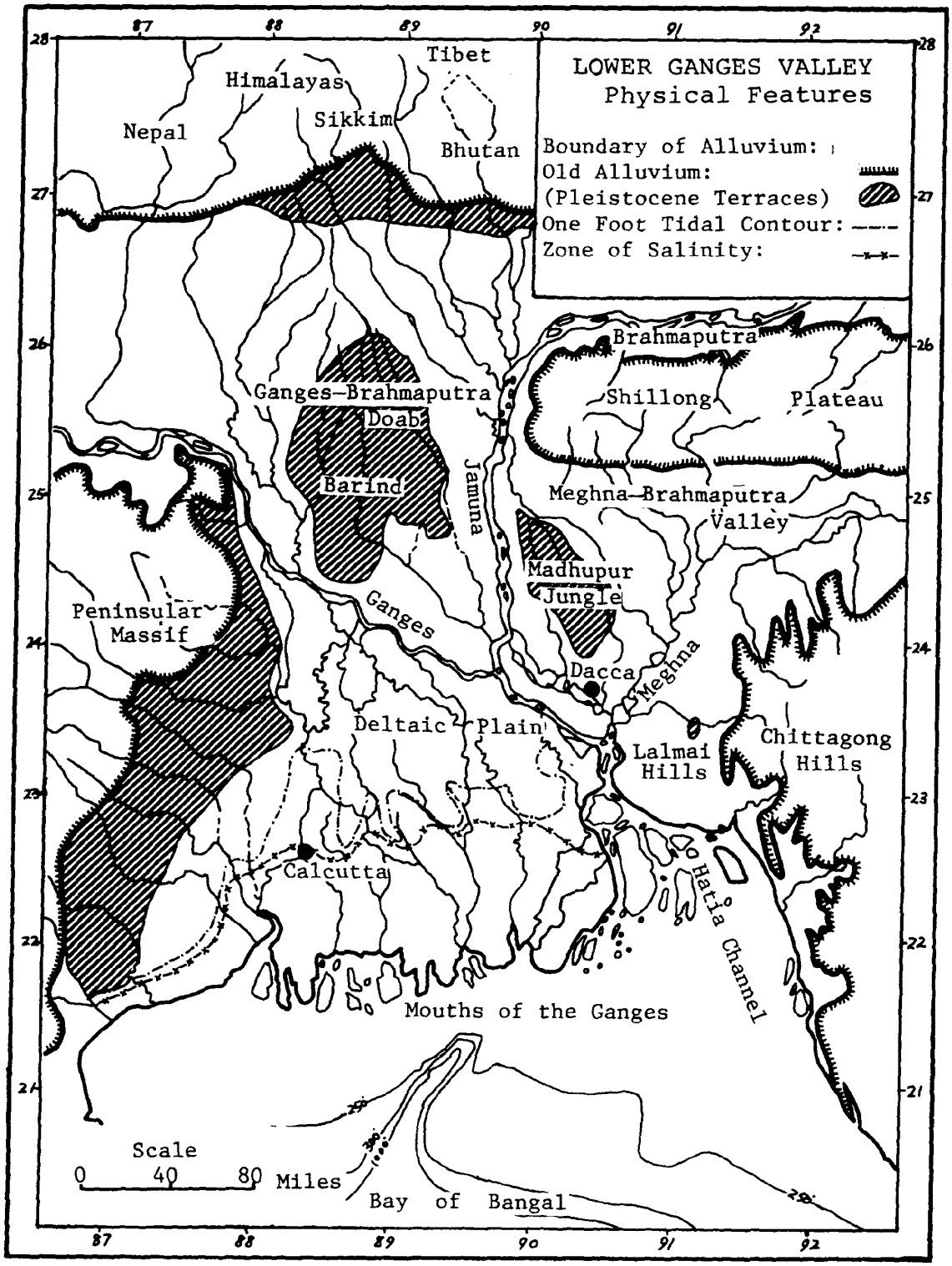
LOWER GANGES VALLEY
Physical Features
Boundary of Alluvium:
Old Alluvium:
(Pleistocene Terraces)
One Foot Tidal Contour:
Zone of Salinity:
Tibet
Himalayas
Nepal
Sikkim
Bhutan
Brahmaputra
Shillong
Plateau
Ganges-Brahmaputra
Doab
Barind
Jamuna
Meghna-Brahmaputra
Valley
Madhupur
Jungle
Peninsular
Massif
Ganges
Dacca
Meghna
Deltaic
Plain
Lalmai
Hills
Chittagong
Hills
Calcutta
Hatia Channel
Mouths of the Ganges
Scale
0 40 80 Miles
Bay of Bangal
87
88
89
90
91
92
28
27
26
25
24
23
22
21

Figure II-1

Different types of soils in given physiographic units in Bangladesh are largely attributed to the three major rivers and their tributaries and distributaries, their regimes, and the different types of deposits laid down by them. According to Chatterjee,[1] most of the soils are azonal, that is, have no profiles. They have been derived from alluvial deposits; and the soils and soil associations vary depending upon what river laid them down. On the basis of texture these can be classified into groups, such as sands, sandy loams, clays, clay loams, and silt loams. It is, however, only in the case of Pleistocene terraces and saline soils that their boundaries can be drawn satisfactorily.[2]

Within given areas soils vary widely with topographic features including different levels of land elevation. It is generally understood that the soil associations gradually change from coarse-textured at higher levels to a finer textured variety at lower levels. It should be noted that a particular fertile soil in Bangladesh does not necessarily reflect higher crop productivity: for example, the most fertile soil in the lowest level of land where only one crop is possible during the dry season and no other cropping can be practiced, since the land is submerged under deep water during the other seasons (see Chapter IV).

Bangladesh is characterized by a tropical monsoon type of climate. Figure II-2 shows the distribution of mean annual rainfall. The major part of Bangladesh, particularly the south-eastern part, the Sylhet basin, and the northern extreme, has heavy and even excessive rainfall. It gradually decreases toward the west-central part, the driest, which receives less than 55 inches. The year can be divided into three periods by noting well-marked variations in rainfall: (1) dry or winter, (2) chota-barsat (little rains) or "nor'wester", and (3) rainy

---

[1] S. P. Chatterjee, Bengal in Maps (Calcutta: Orient Longmans, 1949), p. 11.

[2] A. A. Islam, Agriculture in East Pakistan: an Analysis of the Man-land Relationship (unpublished Ph.D Dissertation, Department of Geography, Clark University, 1964), p. 20.

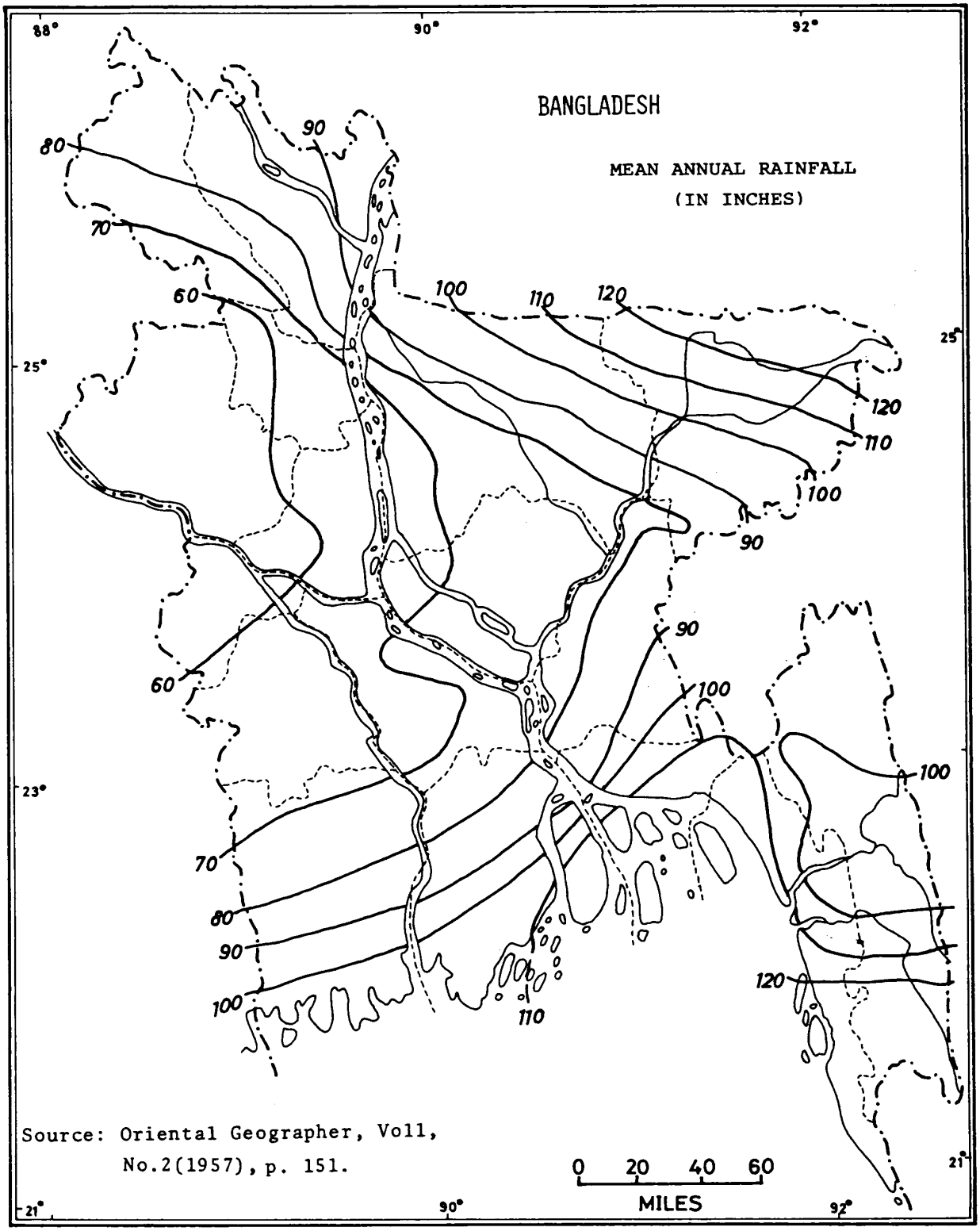
BANGLADESH
MEAN ANNUAL RAINFALL
(IN INCHES)
88°
90°
92°
25°
23°
21°
80
90
70
60
100
110
120
90
100
110
120
90
100
60
70
80
90
100
110
120
Source: Oriental Geographer, Voll,
No.2(1957), p. 151.
0 20 40 60
MILES

Figure II-2

or monsoon. The dry season extends from November to February when the wind blows from the northeast and rainfall accounts for not more than four per cent of the annual total. The chota barsat season from March to May is characterized by "nor'wester" thunderstorms which continue with increasing frequency until the monsoon rains "break" in June. Rainfall during this period, on the average, accounts for one-fifth of the annual total. The monsoon rains during the period between June and October bring more than seventy-five per cent of the annual total and are therefore the main source of water supply for cultivation in Bangladesh.

The morphological features and climatic characteristics combine with one another to provide the main physical conditions for agricultural activities in Bangladesh. Bengali farmers seem to have well perceived these physical characteristics and to have developed their farming by adapting themselves to their physical surroundings with their highly capable, but still naive, methods and techniques.

## The Study Villages

### South Rampur Village in the Comilla District

The region in which South Rampur village is located constitutes a physiographic unit which could be called the Comilla Plains (Fig. II-3). The Gumati, a tributary of the Meghna, meanders through the northern part of the region and, as one of the more important physiographic agents, controls the flat flood plains of Comilla.

Comilla town, the district capital, had a population of 86,466 in 1974 and ranked ninth among the municipalities in Bangladesh. It is located about sixty miles east-southeast of Dacca, the national capital, and about a hundred miles north of Chittagong, the major port of the country. The Bangladesh Railway runs from northwest to south, connecting Comilla with Dacca and Chittagong. The Chittagong Road runs from north to south along the border which separates Bangladesh from the Tippera State of India.

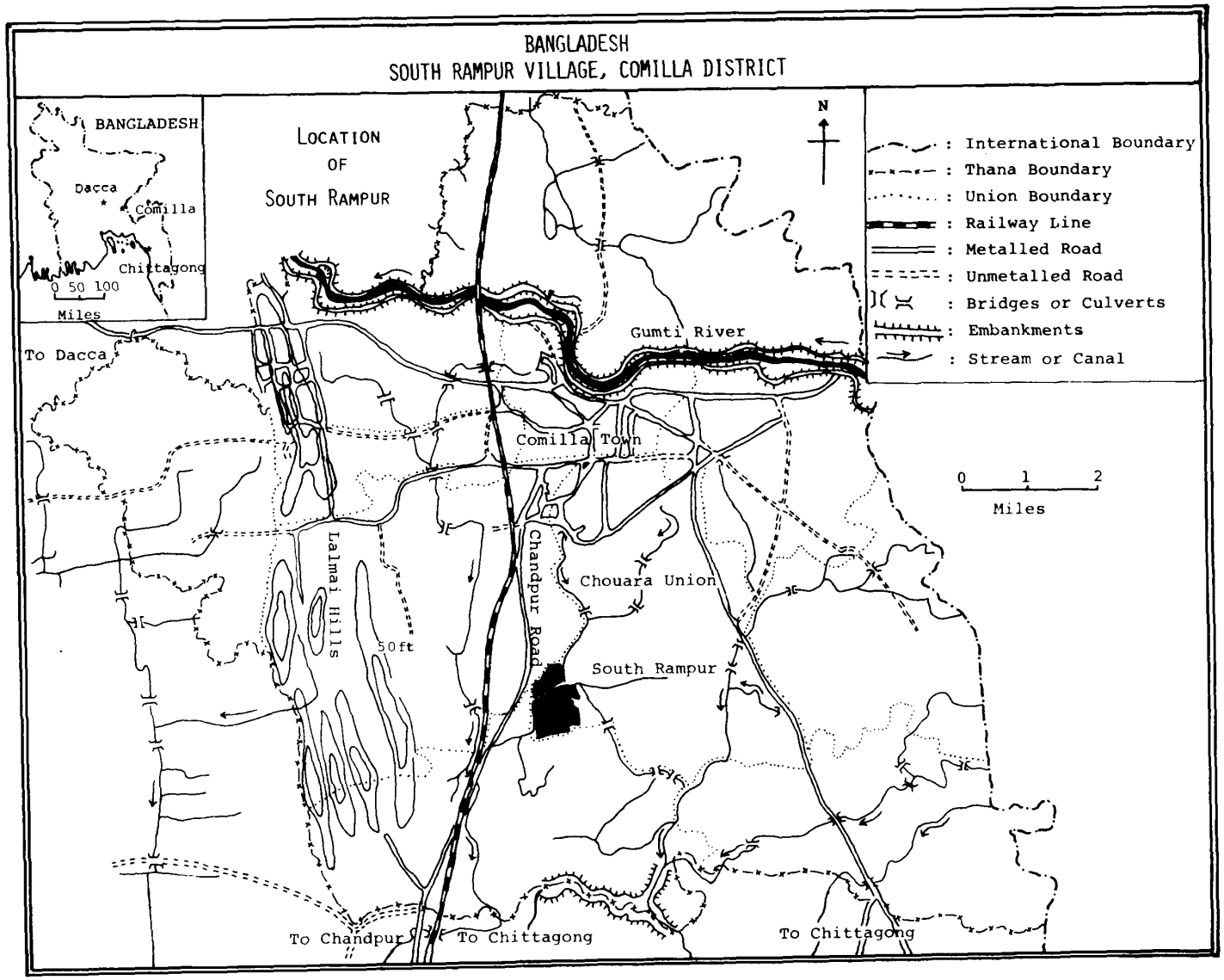
BANGLADESH
SOUTH RAMPUR VILLAGE, COMILLA DISTRICT
BANGLADESH
Dacca
Comilla
Chittagong
0 50 100
Miles
LOCATION
OF
SOUTH RAMPUR
N
: International Boundary
: Thana Boundary
: Union Boundary
: Railway Line
: Metalled Road
: Unmetalled Road
: Bridges or Culverts
: Embankments
: Stream or Canal
Gumti River
To Dacca
Comilla Town
0 1 2
Miles
Lalmai Hills
50ft
Chandpur Road
Chouara Union
South Rampur
To Chandpur
To Chittagong
To Chittagong

Figure II-3

South Rampur is located five miles south from the center of Comilla and has a territory of 319 acres. It is one of the twenty-nine villages which constitutes the Chouara union of the Comilla-Kotawali thana (police station), Comilla district. A union road 200 yards long connects the village with Chandpur Road which runs from northeast to southwest between Comilla and Chandpur.

The inhabitants of South Rampur are all Moslems. They numbered 500 people with 90 families in the first research stage of 1962 and 595 people with 99 families in the second research period of 1969. The residential settlements cluster mostly around the center of the village territory, except for four families living in the northern corner of the village (Fig. II-4). These settlements and their surrounding higher level-fields in South Rampur are at least partly man-raised lands (Fig. II-5) because, without ground-raising, most of the area would not be secure from floodings during the rainy season. Tanks (pushkurni), originating as borrow-pits, and small ditches (doba) immediately around these settlements and higher agricultural fields are consequences of such ground-raising.

Water for everyday use in the villages of Bangladesh are usually supplied by rivers, tanks, two types of traditional artesian wells called kuwa and indra, and manual-tube wells. In South Rampur, four tube wells (two of them were installed in 1960 and the other two in 1962) and a score of tanks are in use.

Of the 99 families in 1969, 97 were divided into 18 different kinship neighborhoods called bari.[1] Each such neighborhood bears a distinctive name according to its relative position to the village center (such as northern bari), according to the names of the people who established or resided in these neighborhoods, or according to features of the areas where neighborhoods cluster (such as in-the-fields bari). Members of each neighborhood usually have clearly defined shares in the use of the tanks for cooking, washing, and bathing, and the use of a courtyard for drying and threshing of grains.

---

[1] Bari has many meanings: house or home, household, family or kin-group, etc.

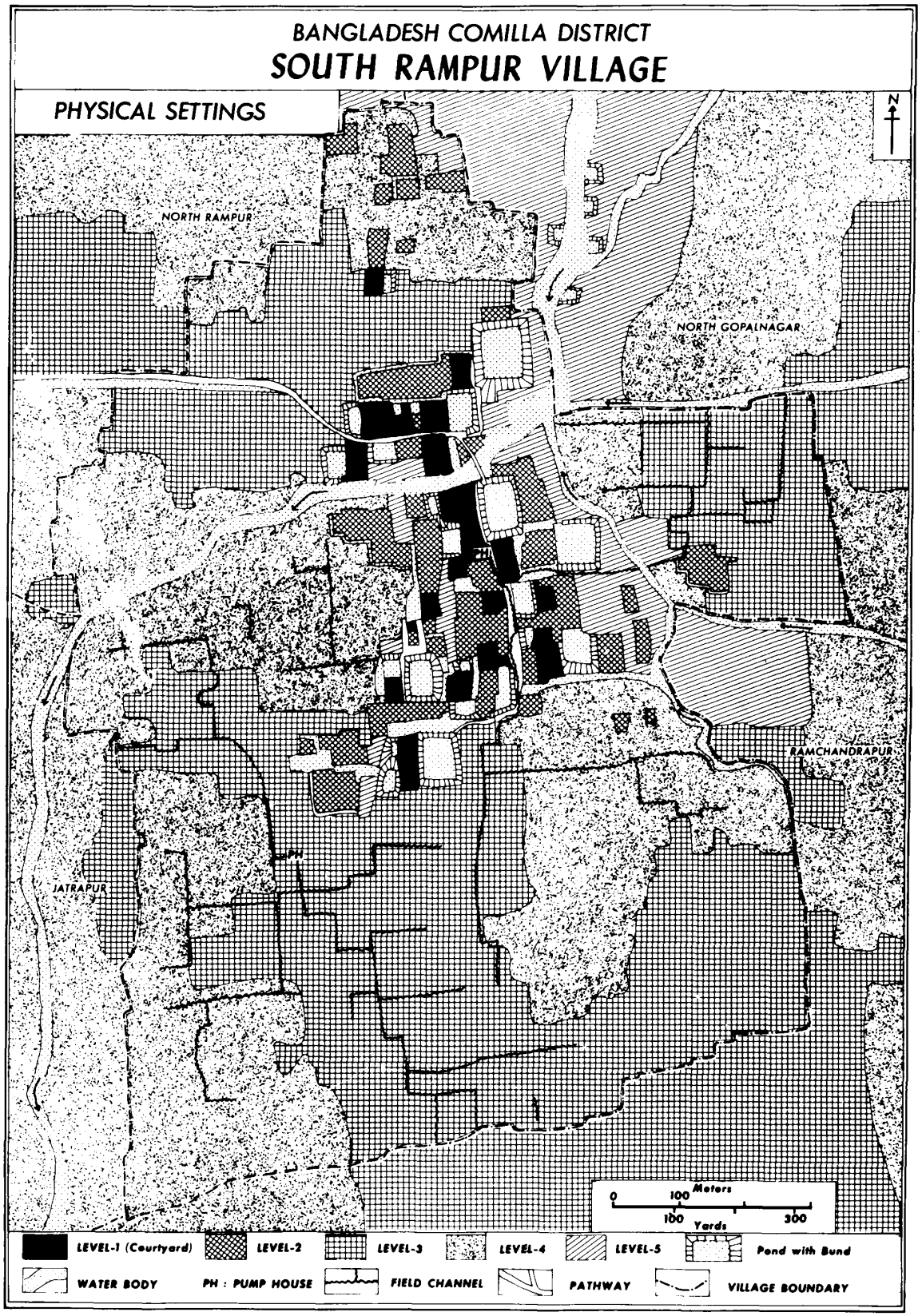
BANGLADESH COMILLA DISTRICT
SOUTH RAMPUR VILLAGE
PHYSICAL SETTINGS
N
NORTH RAMPUR
NORTH GOPALNAGAR
RAMCHANDRAPUR
JATRAPUR
PH
0 100 Meters
100 Yards 300
LEVEL-1 (Courtyard)
LEVEL-2
LEVEL-3
LEVEL-4
LEVEL-5
Pond with Bund
WATER BODY
PH : PUMP HOUSE
FIELD CHANNEL
PATHWAY
VILLAGE BOUNDARY

Figure II-4

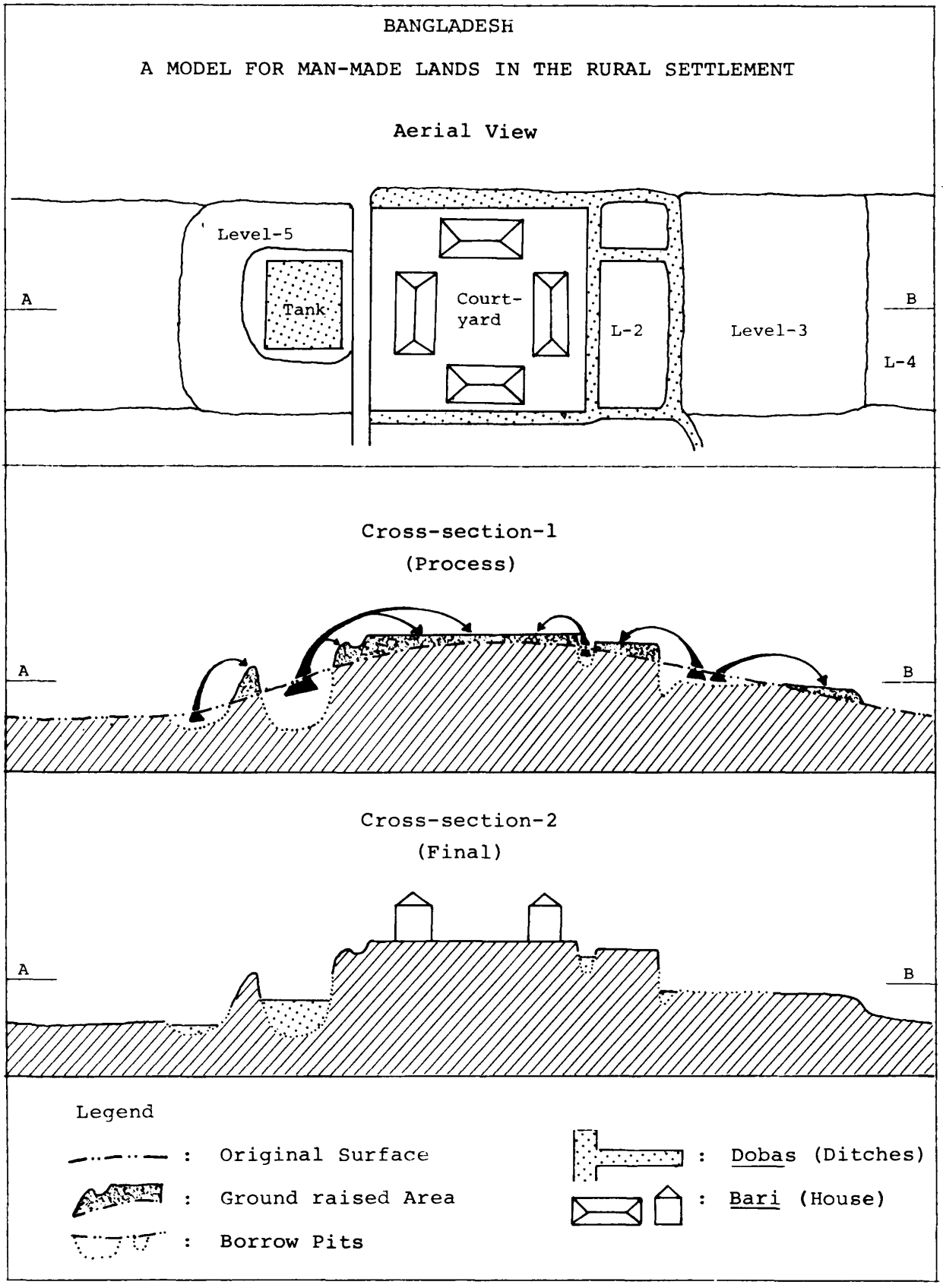
BANGLADESH
A MODEL FOR MAN-MADE LANDS IN THE RURAL SETTLEMENT
Aerial View
Level-5
Tank
Court-
yard
L-2
Level-3
L-4
A
B
Cross-section-1
(Process)
Cross-section-2
(Final)
Legend
: Original Surface
: Ground raised Area
: Borrow Pits
: Dobas (Ditches)
: Bari (House)

Figure II-5

There are two mosques, one in the village center and the other near the village gate, which are freely used by all male members of the village. The village hires a Moslem religious practioner, moulvi, for its madrasha. The madrasha was build on the premises and donated by one of the rich families of the village for the religious education of the children of pre-school and school age. There is an elementary school just outside the village gate near the bus stop. Near the bus stop there are two tea shops, one of which also sells sundries. Within a one-mile radius of the village, there are four market places which are open two days a week in turn. The villagers of South Rampur frequent only two of these markets because of the easier accessibility to them provided by the matalled roads.

In order to understand the background of the agricultural activities in South Rampur, it is indispensable to refer briefly to the relatively recent agricultural development programs directed for Comilla-Kotowali thana as a whole. These programs were initiated by the Bangladesh Academy for Rural Development (BARD) in 1960. The guidelines adopted by the Academy have been multifarious, but suffice it to mention three: (1) education and training of cultivators for the improvement of agricultural technology and management; (2) establishment of public agencies which undertake to make needed capital and agricultural instruments available to villagers; (3) organization of co-operative societies at the village level which function to channel these programs to the villagers.

The attempt at organizing agricultural co-operative societies has been by no means free from difficulties and drawbacks. During the early period of development (1961-62), the membership in the co-operatives varied considerably (Table 1 in the Appendix). During the period between 1962 and 1967, the number of co-operatives and their members increased steadily as the Academy accumulated experience through trial and error and thereby gained increasing acceptance of its programs by the villagers. During the period between late 1968 and early 1969 when the second research stage was under way in South Rampur, many villagers showed overt dissatisfaction of the programs of the Academy in which they had been participating. The underlying reason for their dissatisfaction was no doubt partly

related to the political unrest to which the country as a whole was then subjected.

Palas Village in the Dacca District

The region in which Palas village is located lies in the southern section of the Pleistocene terraces of Madhpur Jungle (Fig. II-1). It slopes from north to south and is well dissected by sheet and head erosion. The dissected areas turn into water channels during and right after the rainy season and are also utilized as paddy fields. The immediate physiographical unit is demarcated on the west by the Lakshya, a tributary of the Meghna, between Pakarganj on the north and Ghorasal on the south, and on the east by the main drainage channel which runs from near Pakarganj to the west of Jinardi and turns eastward to discharge into the Lakshya to the south of Ghorasal (Fig. II-6).

Figure II-7 shows some physical settings within Palas village. The settlements are found on "islands" of Pleistocene land surfaces left relatively untouched by dissection. The more dense and somewhat linear type settlements found on the natural levees of the Lakshya also indicate, upon closer scrutiny, the selection of residential sites according to relative land levels. A few settlements are found on relatively higher land, which, as a result of artificial ground-raising, is also the case in South Rampur.

Palas is one of the nine villages constituting the Ghorasal union of the Kaliganj thana, Dacca district. The village is located on the left bank of the Lakshya, 1.5 miles north of Ghorasal, the nearest and rapidly expanding service center. Ghorasal is located about 22 miles northeast of Dacca. Two major railways, one running between Dacca and Sylhet and the other between Dacca and Chittagong, pass through Ghorasal Flag Station. It takes 50 - 60 minutes by express, or 1.5 - 2 hours by local train to travel the 28 miles from Ghorasal to Dacca. Ghorasal has a jetty on the Lakshya. Motor launches regularly carry passengers to Kapasia 12 miles north of Ghorasal, and to Kaliganj 4 miles south of Ghorasal. By way of the jetty at Demra-Ghat 18 miles south, people and goods reach Narayanganj, one of the major industrial areas of Bangladesh. Sail boats

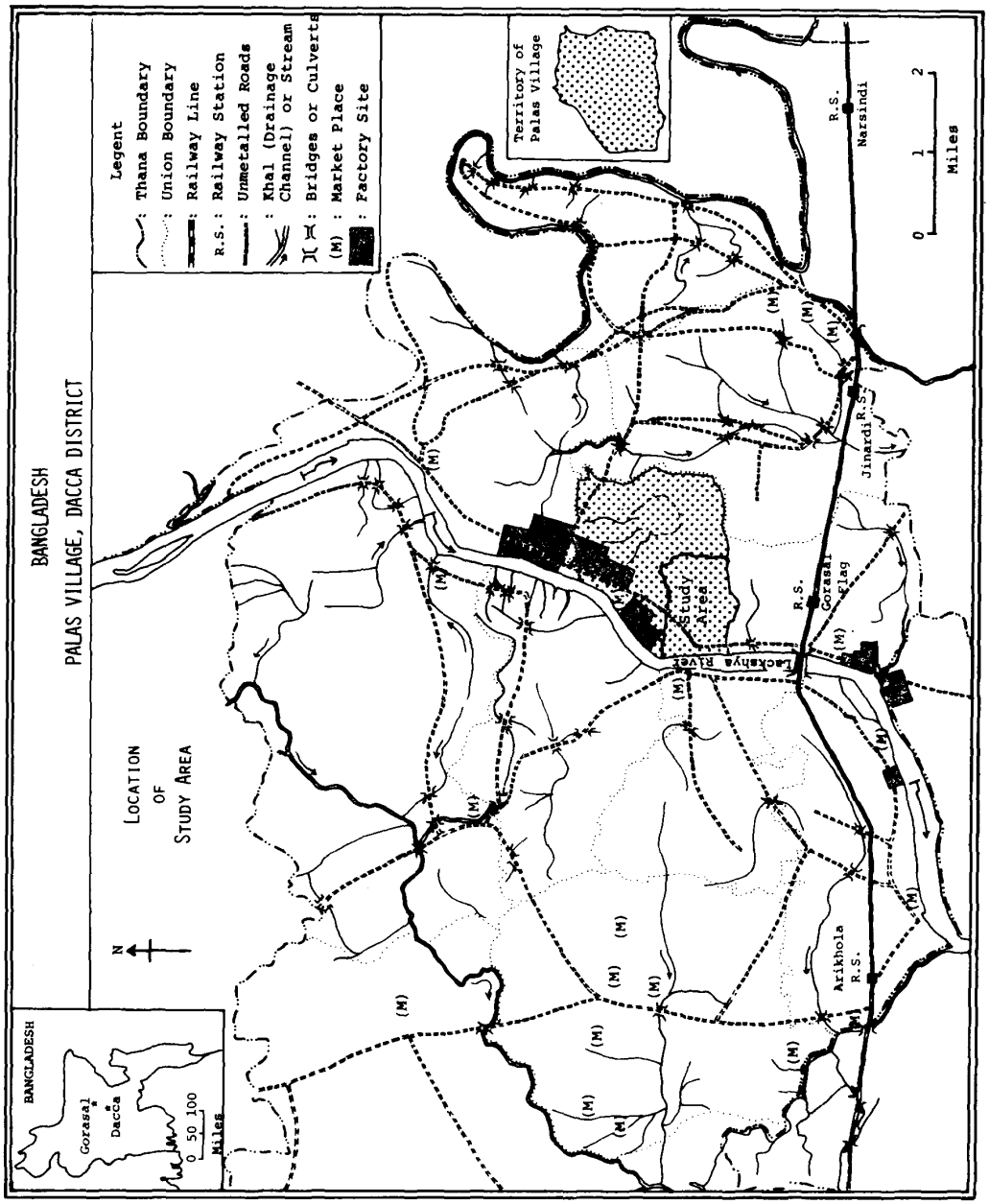
BANGLADESH
PALAS VILLAGE, DACCA DISTRICT
Legent
: Thana Boundary
: Union Boundary
: Railway Line
R.S. : Railway Station
: Unmetalled Roads
: Khal (Drainage Channel) or Stream
: Bridges or Culverts
(M) : Market Place
: Factory Site
Territory of Palas Village
LOCATION OF STUDY AREA
N
BANGLADESH
Gorasal
Dacca
0 50 100
Miles
Study Area
Jinardi R.S.
R.S.
Gorasal
Flag
(M)
Arikhola R.S.
R.S.
Narsindi
0 1 2
Miles

Figure II-6

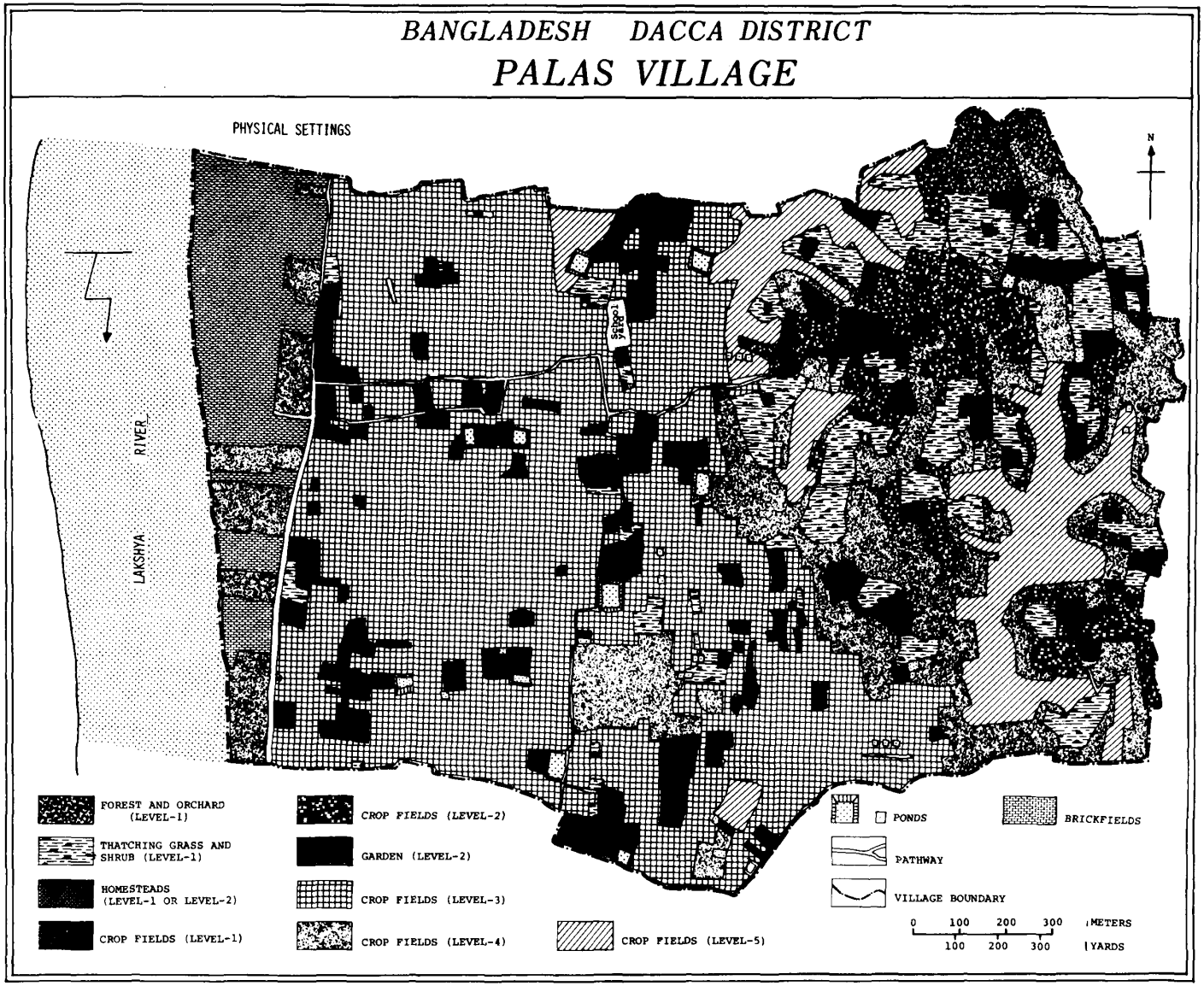
BANGLADESH DACCA DISTRICT
PALAS VILLAGE
PHYSICAL SETTINGS
LAKSHYA RIVER
N
FOREST AND ORCHARD (LEVEL-1)
THATCHING GRASS AND SHRUB (LEVEL-1)
HOMESTEADS (LEVEL-1 OR LEVEL-2)
CROP FIELDS (LEVEL-1)
CROP FIELDS (LEVEL-2)
GARDEN (LEVEL-2)
CROP FIELDS (LEVEL-3)
CROP FIELDS (LEVEL-4)
CROP FIELDS (LEVEL-5)
PONDS
BRICKFIELDS
PATHWAY
VILLAGE BOUNDARY
0 100 200 300 METERS
100 200 300 YARDS

Figure II-7

carrying grain, jute, bricks, and pottery are towed and rowed up and down the river. Ferry boats and fishermen's boats also bunctuate this idyllic aquatic landscape.

The banks of the Lakshya between Pakarganj and Kaliganj have been under-going industrialization since 1954. One textile mill, seven jute mills, two sugar mills, one urea fertilizer factory, and one power house have been established, of which the two jute mills, the power house, and the fertilizer factory are now in operation on the northern outskirts of Palas. The industrial sites were generally chosen from among relatively high land surfaces of the natural levee of the Lakshya. The sites for the power house and the fertilizer factory include the area which was in 1962-63 a low dissected land level but is now reclaimed.

The development of factories has brought about the establishment of a number of shops and tea houses nearby. The Palas market on the northwest section of the village, which had been merely one of those small and periodic village markets till 1963, had become a fixed establishment complete with branch offices of some nation-wide banks by 1969.

An intensive survey was conducted in the southwestern section of Palas,[1] which is relatively undisturbed by the establishment of factories. The exclusion of industrial sites and their associated residential quarters for the factory staff and workers, service establishments, and the like is the primary objective of this research, which is to find the degree of the impact the process of industrialization has brought on agricultural activities. The surveyed section covers a little more than one-fourth, 648.02 acres, of the total village territory of 2,389 acres.

In 1968, the village had a population of 1,827 in 329 families, which consisted of Moslems (1,349 persons in 241 families), and Hindus (473 persons in 88 families). Normally settlements of the Moslems are separated from those families of the

---

[1]For the sake of clarity, "Palas" or "the village" when used unspecified means this surveyed section of the Palas village. Any reference to the entire village will be specified to that effect.

Hindus. Even if they are adjacent, there is no frequent or close daily contact between them.

A main road runs along the natural levees of the Lakshya, connecting Palas with Paikisha village and Ghorasal to the south and the neighboring villages to the north. Due to the development of factories, rickshas are employed to transport people and goods along this road between Ghorasal and the industrialized area. Except for the main road, the road and/or pass way network in the village, like in most of the other villages of Bangladesh, is irregularly developed and related to the terrain configuration; each road has been built on the relatively higher natural land or on man-raised land in order to avoid the flood waters during the rainy season.

There is less trouble for villagers to travel in any direction during the dry season regardless of the availability of roads or pass ways in that they know their way around the paddy fields. However, this changes during and right after the rainy season. Some settlements on the western part of the village are cut off from the rest during the above-mentioned period, and the villagers have to make use of tiny dinghies to travel across the flooded paddy fields.

Compared with South Rampur, Palas does not have an extensive distribution of water tanks. Especially in the eastern area, tanks are seldom seen, partly due to the rapid sedimentation in the area. A few tanks found on the 1890's village (mauza) map are now almost filled up. Water for daily use in the eastern area is largely supplied by the two types of artesian wells, kuwa and indra, which usually have a 20 to 50 yard service radius. In the western area, villagers primarily utilize the Lakshya, and tanks and manual-tube wells as well, if available. Little ponds found in swampy depressions are generally not for daily use, but for fishing and the irrigation of paddy, vegetables, and tobacco during the dry season.

There are two elementary schools, one on the north and the other in neighboring Paikisha to the near south of Palas, and two madrasha, one near the southern border between Palas and Paikisha and the other near the main road on the Lakshya bank. One mosque is under construction on the south. Villagers can avail themselves of two outside mosques, one near Ghorasal

Station and the other recently built in the Palas market near the factories. Two Hindu temples are found just outside the northeastern corner and in the southwestern corner near the Lakshya. The temple in Paikisha draws Hindus not only from Palas but also from Ghorasal.

The market places which villagers regularly utilize are the Palas market, the Ghorasal market, and the Jamarpur market just across the Lakshya. Sometime after 1963, four shops which sell sundries (mudi dokan) were established along the road on the Lakshya bank, and so were three tea houses which operate for about six months of the dry season when the manufacture of bricks continues in the area between the Lakshya and the nearby main road.

Chandipur Village in the Kushtia District

The region of which Chandipur village is a part is located where the Ganges forks southward to form "the Ganges Delta". The region appears to have been originally under far more direct influence of the vicissitudes of the Ganges than it is now. These natural levees were formed by the Ganges and Gorai running roughly from north to south to the east of Chandipur village. The land level gradually descends westward from this natural levee and forms a back swamp in the eastern part of Chandipur. The physical settings and settlement patterns in Chandipur and its adjacent area have been influenced by recent physio-morphological changes, part of which were atrifically affected. Figure II-8 shows the general surroundings of Chandipur village. Chandipur is one of the nine villages which constitutes the Bheramara union of Bheramara thana, Kushtia District. It is located 2 miles south of Bheramara, which is located 95 miles west-northwest of Dacca and 15 miles northwest of Kushtia, the district capital. The railway which runs between Dacca to Khulna via Mymensingh, passes through Bheramara, and provides access to Khulna via Mirpur. The road built on the natural levee of the Ganges and the Gorai also connects Bheramara with Kushtia.

The region is included in the Ganges-Kobadak Project which has attempted to develop a large irrigation network.

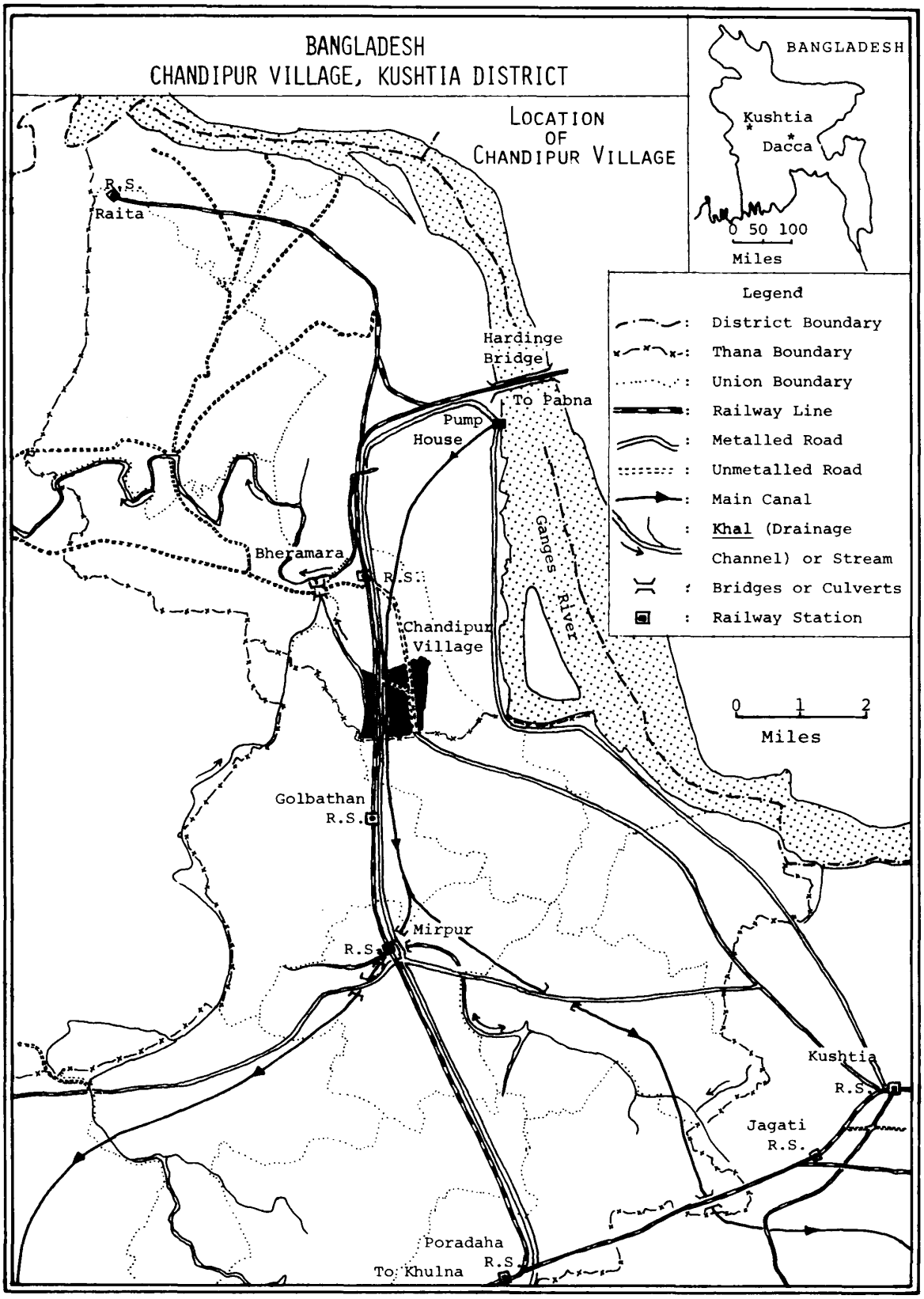
BANGLADESH
CHANDIPUR VILLAGE, KUSHTIA DISTRICT
LOCATION OF CHANDIPUR VILLAGE
BANGLADESH
Kushtia
Dacca
0 50 100
Miles
Legend
District Boundary
Thana Boundary
Union Boundary
Railway Line
Metalled Road
Unmetalled Road
Main Canal
Khal (Drainage Channel) or Stream
Bridges or Culverts
Railway Station
R.S. Raita
Hardinge Bridge
To Pabna
Pump House
Ganges River
Bheramara
R.S.
Chandipur Village
0 1 2
Miles
Golbathan R.S.
Mirpur R.S.
Kushtia R.S.
Jagati R.S.
Poradaha R.S.
To Khulna

Figure II-8

Districts included in the project are Kushtia, Jessore, and Khulna. Twelve generators, the installation of which was completed in Bheramara by 1969, pump water from the Ganges. They are expected to distribute water to 350,000 acres of land.[1] Since its inception in 1954, the major part of the first phase covering half the total area, 130,000 acres, in Kushtia district had been completed by 1965. The main canal is divided into secondary channels of 2 or 3 yards width, which are capable of feeding 1 or 2 villages, and then into tertiary channels to distribute water to agricultural fields.

The major benefits accruing from this project are expected to be: (1) multiple cropping, (2) protection from flood damage and improvement of drainage facilities, (3) availability of navigable channels and embankment roads, (4) improvement of canal-fishing. The agricultural extension work is under the direct control of the Bangladesh Water Development Board (BWDB).[2] Agricultural co-operatives called "chasi clubs" are organized as units of these extension works.

Figure II-9 shows some physical settings within Chandipur village. Chandipur village has a territory of 603 acres. There are three sets of linear-type settlements: one between the channel (khal) on the west of the village and the railway track running close to the main canal (West Chandipur), another on the right bank of the backswamp and the other along the path which runs toward the canal from the center of the eastern settlements. The eastern settlements in the village are of relatively recent origin. According to the village (mauza) map compiled during 1915 - 1916, the residential settlements were found on the now entirely vacant southern section of the village. As the backswamp became less and less subject to floods from the Ganges, the village settlements started to take the shape

---

[1] A. Farouk, Irrigation in a Monsoon Land (Dacca: Bureau of Economic Research, University of Dacca, 1968), pp. 12-13.

[2] It was previously named East Pakistan Water and Power Development Agency (EPWAPDA).

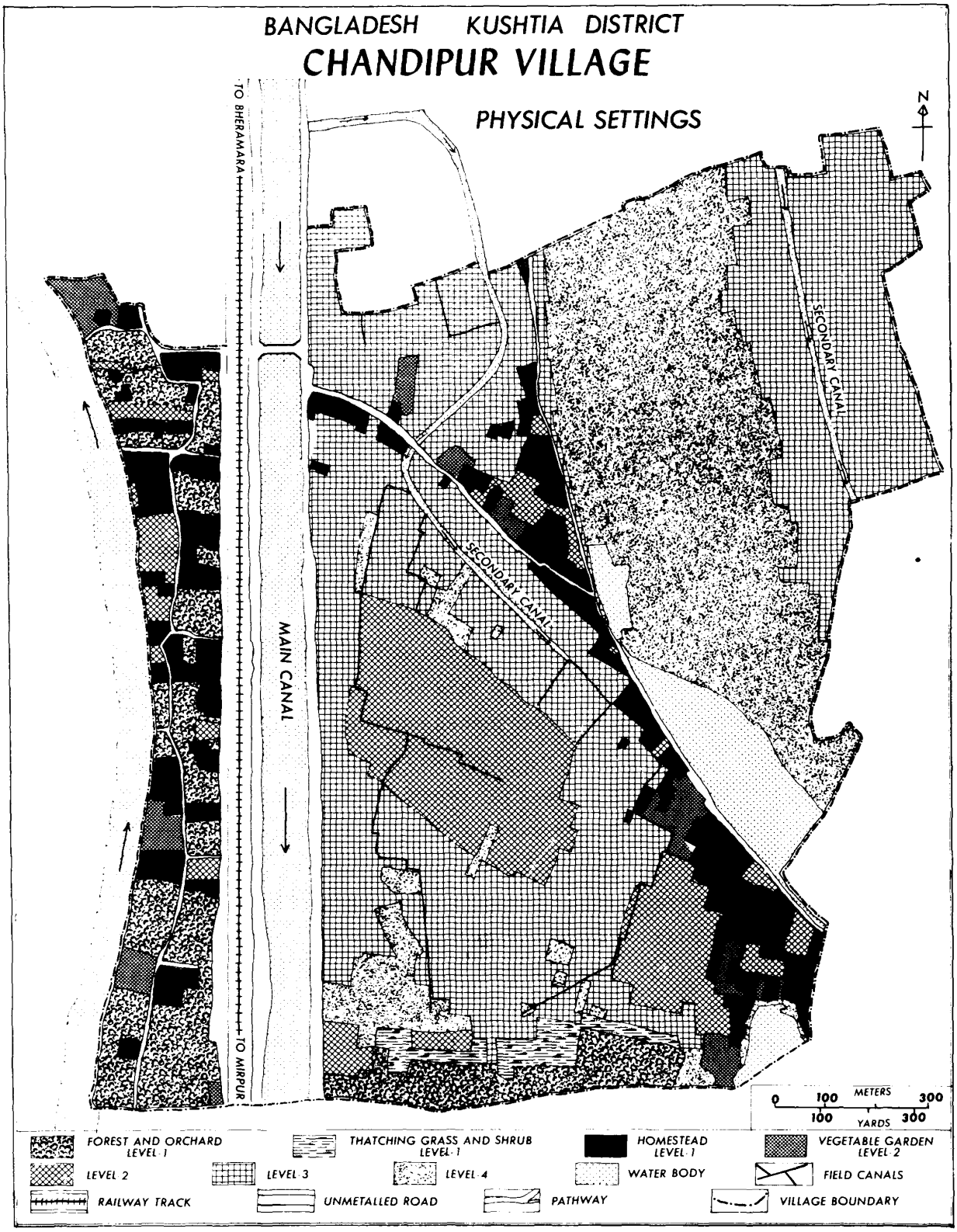
BANGLADESH KUSHTIA DISTRICT
CHANDIPUR VILLAGE
PHYSICAL SETTINGS
N
TO BHERAMARA
TO MIRPUR
MAIN CANAL
SECONDARY CANAL
SECONDARY CANAL
0 100 METERS 300
100 YARDS 300
FOREST AND ORCHARD LEVEL-1
LEVEL 2
LEVEL-3
LEVEL-4
THATCHING GRASS AND SHRUB LEVEL-1
HOMESTEAD LEVEL-1
WATER BODY
VEGETABLE GARDEN LEVEL-2
FIELD CANALS
RAILWAY TRACK
UNMETALLED ROAD
PATHWAY
VILLAGE BOUNDARY

Figure II-9

they have now.[1] The move to the eastern settlements has continued by drawing residents from West Chandipur and the area where the main canal runs at present, and immigrants from the adjacent villages. In the four or five years after 1964, four families have set up residence just west of the eastern settlements.

In 1968, Chandipur had a population of 1,512 persons in 249 families, which consist of Moslems (1,435 persons in 234 families) and Hindus (77 persons in 15 families). All of the 15 Hindu families live in West Chandipur. The Hindu settlements here were originally bigger, as suggested by the existence of 10 abandoned courtyards, now owned, but not used, by the Moslems. Ten Moslem families now residing in West Chandipur came from Mushibadad in India. Since the 1947 partition, they arranged to exchange land and other immovable possessions with the now emigrated Hindus of the village, one of whom was a talukdar with the authority to collect taxes from the entire village.[2]

The main canal of the Ganges-Kobadak project which runs through the village and the two channels on its sides supply water for daily use as well as for cultivation. Accordingly, few tanks are in use in the village. Traces of tanks are found, however, in the southern section where settlements were originally founded. In addition, ten indra wells, four in West Chandipur and the rest in the eastern settlements, are in service.

There are five mosques on the left bank of the main canal, two of which are publicly owned and the other three privately owned. The private mosques also function as madrasha for children. One elementary school is on the northeast of the village and another is planned for the southeast side. Villagers frequent three markets in Bheramara and sporadically go to those in Mirpur. One sundry shop is in the north between the railway tracks and the main canal.

---

[1]The earliest recorded settlement dates back to 1929, as indicated by the inscription on one of indra wells found in the eastern settlements. The oral tradition, however, sets the date about ten years prior to 1929.

[2]The house of the talukdar, now owned by a Moslem family from Mushibadad, is one of the two, two-story brick buildings in the village. The other building is occupied by a Hindu family.

# CHAPTER III

# GENERAL CROPPING PATTERNS AND RECENT AGRICULTURAL PROGRAMS IN BANGLADESH

## The Arable Land

As previously mentioned, water necessary for agriculture in Bangladesh depends mostly upon the monsoon rains. Under the traditional "rainfall farming", cultivation of specific crops has much to do with the variegated physiographic conditions of the arable land. The seasonal variation of availability of water of crop-land generally corresponds to different elevations. With regard to their uses, five major categories of land surfaces are found in Bangladesh, although each of these categories does not necessarily form a distinct terrace. Each level of these surfaces for the purpose of this study is designated as Level-1 through Level-5, corresponding respectively to the graduation from the highest down to the lowest levels. The first two surfaces are free or made free from flood waters; and the rest are submerged under flood water during the rainy season. The flood-free land consists partly of natural levees and man-made terraces on the recent alluvial plains, but mostly of Pleistocene terraces. These lands together, however, cover only a small part of the total arable land in Bangladesh. The water volume available on each surface of land varies greatly according to the season (Fig. III-1). At the beginning of the rainy season, each level has its own water surface. Then, the flood water advances very rapidly from the lower to higher surfaces, and covers the lands on Levels-3, -4 and -5 under a single water surface during the period between mid-June and late September, marking the highest water level in July. The water level keeps decreasing gradually toward the final stage of the dry season, during which most of the surface water usually disappears on Level-3 land by late November, on Level-4 by late December, and on Level-5 by early April, although their timing varies to a great extent according to the drainage conditions in a given area.

## LAND-LEVELS AND SEASONAL VARIATIONS OF WATER LEVEL

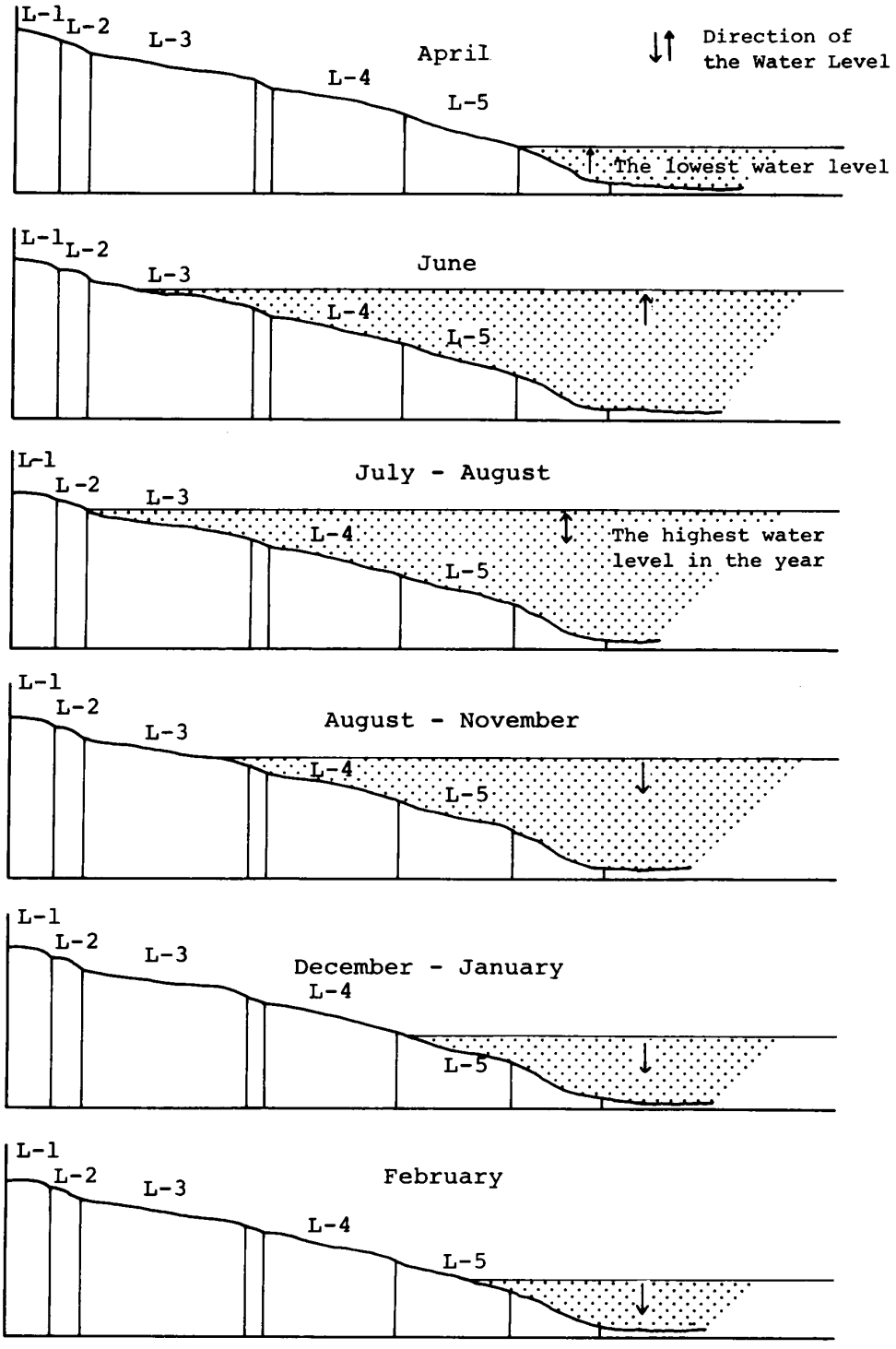


Figure III -1

Pleistocene terraces form isolated pan-like hills above the flood plains. As physiographic units, these hills are very small, and this induces rapid surface run-off. Thus, the term of surface water available on Levels-1 and -2 lands is usually far shorter than those on the lower level lands.

## Crops and Their Seasons

The yearly agricultural cycle in Bangladesh can be divided into three seasons in terms of growing and harvesting of major crops: the first season during April-August (traditionally referred to as bhadoi); the second season during August-December (aghani); and the third season during December-April (rabi). The aggregating of the first and second seasons is called kharif. It is to be noted, however, that these seasons overlap each other rather than being sharply separated. Physical factors including latitudinal differences and ragional physiographic conditions, and managerial factors including timely procurement of the labor forces and bullocks as draft power for ploughing, usually create an overlap of around one to two months between seasons.

In 1976-77, the total cropped area[1] (T.C.A.) including fruits and vegetables in Bangladesh was about 30.44 million acres. The acreage under rice was about 24.42 million acres of 80.21 per cent of the T.C.A. Since rice has such an important position among the crops cultivated in Bangladesh it is justified to focus our discussion in this study upon the various aspects of this rice cultivation and its related problems.

There are four major types of paddy cultivation in Bangladesh classified in terms of their cropping seasons: (1) aus in the first season, (2) shail or transplanted aman (aman-2)

---

[1]Total cropped area (T.C.A.) represents the aggregate area of all crops raised on the same land during the different seasons of the year.

in the second season, (3) jali-aman or broadcast aman (aman-1)[1] covering the first and second seasons, and (4) boro in the third season. Jute, the leading cash crop in this country, ranks second after rice in the cropped area, and is cultivated in the first season. Most of the crops listed in Table 2 in the Appendix have their own cropping seasons, and are mostly cultivated during the period April-October.

These crops can not be arbitrarily cultivated in given fields. There are specific conditions relating to the availability of proper volumes of necessary water for individual crops during its cropping season, which are well reflected in the different relative or absolute elevations of land in a given area. In fact, each cropping distribution corresponds well to the specific land level(s) as shown in Table III-1. If there are satisfactory physical conditions for two or more crops, there is, of course, competition among them, as is well examplified in the case between aus paddy and jute, both of which are cultivated in the first cropping season (April-August).

These croppings in Bangladesh are predominantly undertaken during the kharif period (the first and second seasons); and their cropped area has occupied over 80 percent of the T.C.A. in most past years, although there have been some changes in the seasonal croppings in recent years, which have been derived primarily from the development of boro paddy cultivation in the third (dry) season. This has been made possible by introducing various types of irrigation and improved methods of farming, which will be discussed in the rest of this chapter and the following chapters.

---

[1] In this study, jali-aman or broadcast aman and shail or transplanted aman are designated respectively as aman-1 and aman-2. It is true that most of jali-aman is traditionally sown by the broadcast method, but there have been some changes in the irrigation areas where the jali-aman is transplanted. Since we are concerned with the different cropping seasons as defined above, such a distinction is necessary.

TABLE III-1

RELATIONSHIPS BETWEEN LAND-LEVELS AND MAJOR CROPS IN BANGLADESH

| Cropping Seasons | Lands on | | | | |
|---|---|---|---|---|---|
| | Level-1 | Level-2 | Level-3 | Level-4 | Level-5 |
| 1st Season (Apr.- Aug.) | Aus Vegetables | Aus Sugarcane Vegetables | Aus Jute | Aman-1 Jute | |
| 2nd Season (Aug.- Dec.) | Aman-2 | Aman-2 Sugarcane | Aman-2 | Aman-1 | |
| 3rd Season | Wheat Pulses | Wheat Sugarcane Vegetables Pulses | Boro-2 Pulses Wheat | Boro-2 Pulses | Boro-1 Vege-tables |

Notes: (1) Aman-1 and Aman-2 correspond to Broadcast Aman and Transplanted Aman respectively.

(2) Boro-1 and Boro-2 correspond to the traditional Boro in lower land and irrigated Boro respectively.

(3) Aman-1 requires two cropping seasons to harvest.

(4) Sugarcane requires 10 - 12 months to harvest.

## Different Types of Paddy Cultivation

### Aus

Aus paddy ranked second in the cultivated area among the four types of rice, and occupied 7.81 million acres or 31.5 per cent of the T.C.A. of rice in 1977-78. This type is cultivated in some parts of the Pleistocene terraces on Levels-1 and -2, and extensively in Level-3 lands. Aus is traditionally sown by the broadcast method from late in March through April. It is generally regarded as an early maturing type of rice, and there are some variaties which take only 80 days to ripen.[1]

The first ploughing takes place sometimes in mid-February but mostly early in March when nor'wester rains start breaking up land parched and hardened during the dry season. The ploughing is usually repeated four or five more times towards the end of March, as the frequency of the rains increases gradually. Because the land does not contain sufficient water at the time of sowing, the successful cultivation depends precariously not only upon the timely onset of nor'wester rains, but also upon the opportune follow-up of monsoon rains which usually begin late in May. Aus paddy grows rapidly with the rise of the water level which attains its highest level in July. In accordance with the gradual lowering of the water level, the harvesting of aus proceeds from mid-July through August or sometimes early September. Where the water level on the fields remains high at this time, only the upper part of the stalks is harvested. In some areas, even boats are used for the harvesting, although the paddy is not technically "floating rice".

### Aman-2 (Transplanted Aman)

Aman-2 paddy (shail), cultivated during the second season, occupied the largest cropped area among the four types of rice and amounted to 10.09 million acres or 40.74 per cent of the total cropped area of rice in 1977-78. This type is cultivated in Levels-1, -2 and -3 lands in our land level model.

---

[1] Haroun er Rashid, East Pakistan: a Systematic Regional Geography and its Development Aspects (Lahore: Sh. Ghulam & Sons, 1963), p. 143.

Among these lands for aman-2 cultivation, Level-3 is much more important than Levels-1 and -2 lands, because of its extensive cropped area coverage and higher yields per unit of land. In many areas, aman-2 lands on Level-3 are the same ones used for aus or jute during the previous cropping season (bhadoi).

The seedlings are grown in nursery seed beds (charas), and are ready for transplanting in 5 - 6 weeks. The charas must be flood-free lands because of the heavy monsoon rains during the seedling season. Thus, some of the higher lands around the hamlets are used for charas. If such lands are not sufficiently available for farmers, parts of their lower lands on Level-3 are made into charas by raising them at least to flood-free levels.

The transplanting of aman-2 paddy usually takes place from mid-July through August, although it can be done from early June at the earliest to early September at the latest. The earlier transplanting of aman-2 occurs mostly the Levels-1 and -2 lands, which have lain follow during the previous season. In such areas the preparation, such as plowing and leveling for the crop, begins even before April. On the other hand, later transplanting usually takes place on the Level-3 lands which, as stated above, are used for aus or jute cultivation during the bhadoi season, and thus have to wait until after the harvesting and receding of excess water.

Local varieties used for aman-2 have a date-fixed photoperiod[1], and flower mostly in October when the monsoon rains are no longer present. Because of this situation it is understood among farmers that the earlier the transplanting the better the yield. In fact, if there is great damage to the aman-2 yield, it is caused mostly by a scarcity of water or drought during the latter part of its growing season.

The different timings of the transplanting of the crop are responsible for the variations in the times of harvesting, which occur from early October at the earliest to late January at the latest but mostly during the period from early December to early January.

---

[1]Haroun er Rashid, op. cit., p. 141.

Aman-1 (Broadcast Aman)

Aman-1 (jali-aman) occupied 4.17 million acres or 16.82 per cent of the total cropped area of rice in 1977-79, ranking third after aman-2 and aus in its area coverage. This type is regarded as "deep-water paddy" or "floating paddy"[1] and cultivated almost exclusively in the low-lying areas where the monsoon flooding is normally 3 feet (0.92 m) or more in depth, which corresponds to the Level-4 lands in our land-level model.

There are many varieties of aman-1 (jali-aman) each of which has its own ability to grow in different depths of flooding. With regards to this characteristic of the crop, B.L.C. Johnson wrote:

> ... the plant can grow quickly when the floods come, keeping its head above the rising water. Aman [aman-1] can grow at the rate of at least an inch a day, some varieties as much as 30 cm (12 in.) in twenty-four hours. The long-stemmed aman can produce a stalk 7 m (23 ft) long, and often has to float in water 4.5 m (15 ft) deep.[2]

Aman-1 is a late maturing type of rice, taking usually about nine months[3] which covers two seasons in our cropping season model. Thus, aman-1 shares the common cropping season with aus during the first season, and with aman-2 during the second season. Like aus paddy, it is broadcast on non-flooded lands usually in March-April, and like aman-2, harvested mostly in the clear sunny days of November-December.

In some transitional areas between Levels-3 and -4 lands, aus and aman-1 are sown together in the same lands, but are harvested in different seasons. This practice, called borrar, is the result of the farmers' remarkable clear understanding of how to ensure the harvest of at least one successful crop during the long cropping season. Although neither crop gets its best yield,

---

[1]This type of rice is the same one which is cultivated extensively in the deltaic regions of Southeast Asia.

[2]B.L.C. Johnson, Bangladesh (London: Heinemann Educational Books Ltd., 1975), p. 37.

[3]Noting the term of the aman-1 season, farmers sometimes call it "noi-mash-aman (nine-month-aman)."

the combined yield is greater than the yield of either crop had it been sown exclusively. The same kind of device, known as rayada, is applied to some transitional areas between Levels-4 and -5 where aman-1 and boro are sown together in January, and while boro is harvested in May, aman-1 is harvested the following December.

Boro

Boro paddy, cultivated in the third season, occupied 2.70 million acres or 10.91 per cent of the T.C.A. of rice in 1977-78, the smallest area coverage among the major types of rice cultivation. The plant has been cultivated traditionally on the lower parts of the backswamp depressions, which correspond to Level-5 lands in our land-level model. However, the recent introduction of modern irrigation facilities has made it possible to cultivate boro paddy in some lands other than Level-5 lands, although it is found mostly on the Levels-3 and -4 lands. In the following discussion, the traditional and the recent types are often termed "boro-1" or "traditional boro" for the former, and "boro-2" or "irrigated boro" for the latter respectively.

Boro-1 (traditional) is transplanted in the flooded lands in November-December and harvested in April-May. The plowings for the crop take place from the edges of bils (backswamp depressions) to its center in accordance with the lowering of surface water. In the center of some swampy areas, however, transplantings are started without any plowing or laddering because the draft-animals cannot work in its soft swampy soil. The boro-1 paddy grows as the water level decreases, and towards the end of the dry season, it needs to be irrigated in some areas, especially at the edges of the bils, for which the necessary water is usually supplied from nearby khals (natural water channels) or pushkurni (ponds).

The water necessary for boro-2 cultivation is, by definition, largely dependent upon irrigated water from recently introduced modern facilities including low-lift pumps, tubewells, and gravity canals; without these, the water for boro cultivation would be insufficient on Levels-3 and -4 lands during the dry rabi season.

## Agricultural Development Programs

In order to understand the background of some of the changing aspects of the agricultural activities, it is indispensable to refer briefly to the recent agricultural development programs. Although there have been various types of programs introduced, emphasis has been placed upon two basic types: (1) water development programs and (2) village organization programs.

### Water Programs

The startegy for water development in Bangladesh is dictated by two factors:

> (a) during the monsoonal rainy season (May-September) the big rivers, and their tributaries and branches, overflow their banks, and large quantities of water flood extensive areas. Likewise, the coastal regions are subject to tidal floodings. These flood areas occupy over half of the nation;
> (b) during the relatively long dry season (October-April) rain water is lacking, and thus much of the country suffers from drought, although plenty of water could be made available from the river network, low-lying areas, and underground reserves.[1]

The first factor above calls for flood control and drainage projects most of them being on a large scale with long projection dates. The second calls for irrigation through the supply of tubewells and low-lift pumps to be installed along rivers. These are projects with shorter projection dates which do not involve delays in construction or settlement problems. These two strategies usually are not competitive in physical terms, but in the long-term will probably be so financially.[2]

As previously suggested, the traditional agricultural activities in Bangladesh have been dependent largely upon cropping during the rainy season. However, the repeatedly introduced

---

[1] F. Kahnert, et al., Agriculture and Related Industries in Pakistan (Paris: Development Centre of O.E.C.D., 1970), p. 174. Also see Yoshimi Komoguchi, "Bangladesh no Nogyo-kaihatsu [2] (Agricultural Development of Bangladesh [Part 11])," Aziya Kenkyu, XXI [No. 1] (April 1974), p. 68-73.

[2] F. Kahnert, et al., op. cit., p. 174.

self-sufficiency programs converted the emphasis to cropping during the dry season, in expectation that both governmental and individual inputs toward improved agricultural development would be effective, with relatively quick returns, under the relatively stable physical conditions of the rabi period.

Many schemes for water development have been planned since 1955 when the Ganges-Kobadak Project first started, of which thirteen were completed and fifteen were under execution by 1972.[1] These schemes cover flood control and river embankments, coastal embankments, multi-purpose projects affecting both irrigation and flood control, gravity irrigation schemes, low-lift pumps and tube-well schemes.

The two agencies responsible for water development in Bangladesh are the Bangladesh Water Development Board (BWDB) and the Bangladesh Agricultural Development Corporation (BADC).[2] The BWDB is concerned with the large surface irrigation and water control schemes and tube-well programs. The BADC is responsible for the low-lift pumps and conducts a test program for tubewells.

Of the BWDB's irrigation projects, four major projects, namely, the Ganges-Kobadak-Kushtia Phase 1, the Northern Tube-wells, the Northern Low-lift Pumps, and the Dacca-Demura Projects, with a total commanded area of 273,000 acres, had been completed before 1969-70. However, due to the lack of field channels to carry water from the outlets of the secondary and tertiary canals to the individual plots, the use of the irrigation water was rather slow at first. With the intensive extension activities in the construction of the necessary field channels, the net irrigated area in these projects increased from 119,000 acres in 1967-68 to 170,000 in 1969-70, which is still short of the commanded area, being only 62 per cent as shown in Table III-2.

---

[1] Besides these, there were several feasibility study schemes in which seventeen projects were completed, thirteen in progress, and thirty-one proposed by 1972. See International Development of Japan, Economic Survey of Developing Countries: a Report of Bangladesh (Tokyo: International Development of Japan, 1975), p. 103.

[2] The BWDB and BADC were previously call the East Pakistan Water and Power Development Authority (EPWAPDA) and East Pakistan Agricultural Development Corporation (EPADC) respectively.

TABLE III-2

IRRIGATED AREA BY BWBD'S PROJECTS

| Name of Projects | Commanded Area | Net Irrigated Area in Acres '000' 1968-69 | 1969-70 | 1970-71 |
|---|---|---|---|---|
| Ganges-Kobadak | | | | |
| Kushtia Unit Phase-1 | 120 | 58 | 85 | 95 |
| Northern Tubewells | 80 | 58 | 62 | 55 |
| Northern Low-Lift Pumps | 58 | 11 | 11 | 11 |
| Dacca-Demura | 15 | 8 | 10 | 9 |
| Total | 273 | 135 | 168 | 170 |

Source: Bangladesh Water Development Board, 1972.

TABLE III-3

DEVELOPMENT OF IRRIGATED AREA BY LOW-LIFT PUMP PROGRAM (1960-1972)

| Years | Number of Pumps in Operation | Average Number of Cusec per Pump | Area Irrigated per Cusec Acres | Total Area Irrigated Area |
|---|---|---|---|---|
| 1960-61 | 1,267 | N.A. | N.A. | 64,528 |
| 1961-62 | 1,543 | N.A. | N.A. | 98,163 |
| 1962-63 | 2,024 | 1.70 | 38.5 | 133,043 |
| 1963-64 | 2,456 | 1.85 | 34.1 | 156,281 |
| 1964-65 | 2,238 | 1.95 | 30.0 | 131,129 |
| 1965-66 | 3,420 | 2.05 | 24.6 | 173,553 |
| 1966-67 | 3,990 | 2.14 | 26.4 | 225,105 |
| 1967-68 | 6,558 | 2.08 | 23.3 | 317,803 |
| 1968-69 | 10,582 | 1.89 | 20.7 | 424,799 |
| 1969-70 | 17,844 | 1.84 | 19.6 | 639,000 |
| 1970-71 | 24,454 | 1.85 | 18.3 | 820,074 |
| 1971-72 | 24,254 | 1.84 | 19.4 | 864,427 |

Source: Bangladesh Agricultural Development Corporation, 1972.

TABLE III-4

B.A.D.C. LOW-LIFT PUMPS: DISTRIBUTION AND AREA IRRIGATED BY DISTRICT

| | 1970-71 | | | | 1971-72 | | | |
|---|---|---|---|---|---|---|---|---|
| | No. of Pumps | Average No. of Cusecs Per Pump | Area Irrigated Per Cusec (Acres) | Total Area Irrigated (Acres) | No. of Pumps | Average No. of Cusecs Per Pump | Area Irrigated Per Cusec (Acres) | Total Area Irrigated (Acres) |
| Chittagong | 2,281 | 1.87 | 21.0 | 89,811 | 2,328 | 1.84 | 18.2 | 78,036 |
| Chittagong H.T. | 361 | 1.46 | 17.1 | 9,008 | 327 | 1.42 | 13.5 | 6,300 |
| Comilla | 2,158 | 1.87 | 13.8 | 55,700 | 2,161 | 1.88 | 24.1 | 97,739 |
| Noakhali | 733 | 1.95 | 18.0 | 25,727 | 674 | 1.94 | 17.4 | 22,790 |
| Sylhet | 2,266 | 1.81 | 17.4 | 71,200 | 1,911 | 1.77 | 24.8 | 84,204 |
| Dacca | 2,200 | 1.83 | 18.1 | 73,004 | 2,555 | 1.85 | 21.2 | 100,500 |
| Faridpur | 974 | 1.82 | 12.4 | 22,000 | 978 | 1.82 | 17.9 | 31,897 |
| Mymensingh | 4,449 | 1.89 | 21.0 | 176,719 | 4,254 | 1.89 | 19.3 | 155,683 |
| Tangail | 817 | 1.82 | 21.7 | 32,227 | 811 | 1.82 | 20.4 | 30,194 |
| Barisal | 2,637 | 1.79 | 19.6 | 92,556 | 2,931 | 1.82 | 17.3 | 92,360 |
| Jessore | 440 | 1.72 | 16.4 | 12,367 | 419 | 1.71 | 16.5 | 11,842 |
| Khulna | 596 | 1.76 | 19.5 | 20,500 | 593 | 1.78 | 15.1 | 16,000 |
| Kushtia | 164 | 1.87 | 15.0 | 4,590 | 180 | 1.85 | 7.6 | 2,525 |
| Patuakhali | 1,249 | 1.90 | 20.5 | 48,700 | 1,152 | 1.88 | 20.3 | 44,050 |
| Bogra | 569 | 1.88 | 20.6 | 22,000 | 546 | 1.87 | 20.0 | 20,460 |
| Dinajpur | 237 | 1.75 | 5.1 | 2,130 | 207 | 1.79 | 10.4 | 3,877 |
| Pabna | 455 | 1.77 | 24.8 | 20,000 | 471 | 1.77 | 20.6 | 17,157 |
| Rajshahi | 1,248 | 1.85 | 12.6 | 29,073 | 1,130 | 1.83 | 16.9 | 35,000 |
| Rangpur | 620 | 1.84 | 11.2 | 12,742 | 626 | 1.84 | 11.9 | 13,813 |
| Total | 24;454 | 1.84 | 18.3 | 820,074 | 24,254 | 1.84 | 19.4 | 864,427 |

Source: Bangladesh Agricultural Development Corporation, 1973.

Because increasing emphasis has been placed upon mobile low-lift pump irrigation to enable rapid acceleration in the cultivation of high yielding varieties (HYV's) of rice in the dry season, the BADC's low-lift pump projects have expanded their number of pump installations and their corresponding area since the early 1960's, especially in and after 1965-66 (Table III-3). This is the basic factor behind the recent growth of crop production during the dry season which will be discussed shortly. That the BADC's projects are more extensive over the country than the BWDB's projects, as far as the irrigation projects are concerned, is of geographical importance (Table III-4).

Community Organization Programs

Along with the BWDB and BADC, the Bangladesh Academy for Rural Development (BARD)[1] has contributed to the agriculture and the related rural development. The Academy, started in 1959, was entrusted with the responsibilities of training government officials and conducting research and action programs for rural development.[2] Since then, the Academy has placed more emphasis upon action programs by introducing a series of pilot programs for rural development, e.g., rural administration, co-operatives, irrigation and mechanization, agricultural extension, family planning, rural education, and women's programs. As can be assumed, there were specific problems within the individual programs and some general problems as well affecting the over-all programs. As far as rice cultivation is concerned, the possibility of increasing production per unit of land was proven by Japanese experts even before 1961, by the introduction of some improved methods. However, the technological possibility on a demonstration farm and the individual farmer's adaptation of the new technology at the village level are quite different matters.

---

[1]It was previously named the Pakistan Academy for Rural Development.

[2]Syed A. Rahim, Diffusion of Innovation in a Development System: a Study of Collective Adoption of Innovations by Village Cooperative in Pakistan (unpublished Ph.D Dissertation, Department of Communication, Michigan State University, 1968), pp. 3-5.

The same kind of problem has been common to most of the above programs. Thus how to transmit the new ideas and techniques became one of the most urgent issues for rural development. Because of this problem, the Academy's pilot scheme for rural co-operatives has diversified its scope so as to create more effectively workable conditions for various programs. In fact, most of the Academy's programs have proceeded under primary village co-operatives. The Academy's research results and experiences have led to the formulation of the following national programs: (1) the Rural Work Program (RWP), which is responsible for development of infrastructures such as link-roads, bridges and culverts, irrigation and drainage channels, and community centers; (2) the Thana Irrigation Programs (TIP); and (3) the Integrated Rural Development Program (IRDP) which is concerned with the development of multipurpose co-operatives organized by integrating primary village co-operatives and their federation, namely, the Thana Central Co-operative Association (TCCA).

## Appendix

TABLE 1

DEVELOPMENT OF AGRICULTURAL CO-OPERATIVE SOCIETY IN KOTOWALI THANA, COMILLA DISTRICT

| Years | Number of Co-operative Society | Number of Co-op. Member (persons) |
|---|---|---|
| June 1962 | 61 | 1,860 |
| June 1963 | 112 | 3,523 |
| June 1964 | 119 | 3,581 |
| June 1965 | 139 | 4,424 |
| June 1966 | 157 | 5,050 |
| June 1967 | 215 | 8,047 |

Appendix

TABLE 2-a

CROPPED AREAS OF MAJOR CROPS IN BANGLADESH

(unit: million acres)

| | 1960-61 1964-65 Average | 1965-66 | 1966-67 | 1967-68 | 1968-69 | 1969-70 | 1970-71 |
|---|---|---|---|---|---|---|---|
| 1. Rice | | | | | | | |
| (a) Aus | 6.64 | 7.32 | 6.96 | 8.22 | 7.66 | 8.46 | 7.88 |
| (b) Aman | 14.52 | 14.67 | 14.06 | 14.68 | 14.40 | 14.84 | 14.18 |
| (c) Boro | 1.04 | 1.14 | 1.39 | 1.53 | 2.01 | 2.18 | 2.42 |
| Total | (22.20) | (23.13) | (22.41) | (24.43) | (24.77) | (25.48) | (24.48) |
| 2. Wheat | 0.15 | 0.14 | 0.18 | 0.19 | 0.29 | 0.30 | 0.31 |
| 3. Other Cereals | 0.22 | 0.20 | 0.24 | 0.26 | 0.29 | 0.28 | 0.30 |
| 4. Pulses | 0.93 | 0.83 | 0.90 | 0.89 | 0.92 | 0.91 | 0.92 |
| 5. Oilseeds | | | | | | | |
| (a) Rape & Mustard | 0.54 | 0.47 | 0.49 | 0.53 | 0.55 | 0.54 | 0.53 |
| (b) Til & Linseed | 0.18 | 0.18 | 0.17 | 0.16 | 0.17 | 0.16 | 0.15 |
| (c) Groundnut | 0.02 | 0.02 | 0.04 | 0.06 | 0.08 | 0.08 | 0.08 |
| Total | (0.74) | (0.67) | (0.70) | (0.75) | (0.80) | (0.78) | (0.76) |
| 6. Spices | 0.41 | 0.36 | 0.39 | 0.42 | 0.41 | 0.42 | 0.40 |
| 7. Sugarcane | 0.32 | 0.38 | 0.41 | 0.42 | 0.41 | 0.40 | 0.40 |
| 8. Potato | 0.14 | 0.15 | 0.17 | 0.19 | 0.21 | 0.21 | 0.21 |
| 9. Sweet Potato | 0.10 | 0.11 | 0.15 | 0.16 | 0.17 | 0.18 | 0.18 |
| 10. Fruits & Vegetables | 0.62 | 0.58 | 0.58 | 0.60 | 0.63 | 0.64 | 0.63 |
| 11. Jute | 1.73 | 2.20 | 2.17 | 2.34 | 2.17 | 2.46 | 2.20 |
| 12. Cotton | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 |
| 13. Tea | 0.08 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 | 0.11 |
| 14. Tobacco | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| 15. Others | 0.10 | 0.54 | 0.49 | 0.54 | 0.51 | 0.53 | 0.50 |
| TOTAL | 27.88 | 29.54 | 29.04 | 31.44 | 31.13 | 32.84 | 31.53 |

Source: Directorate of Agriculture, Ministry of Agriculture, 1972.

Appendix

TABLE 2-b

YIELDS OF MAJOR CROPS IN BANGLADESH

(unit: 1,000 tons)

| Crops | 1964-65 | 1965-66 | 1966-67 | 1967-68 | 1968-69 | 1969-70 | 1970-71 | 1971-72 |
|---|---|---|---|---|---|---|---|---|
| 1. Rice | 10,337 | 10,333 | 9,424 | 10,995 | 11,160 | 11,816 | 10,968 | 9,810 |
| 2. Wheat | 34 | 35 | 58 | 58 | 92 | 103 | 110 | 113 |
| 3. Gram and Pulses | 234 | 239 | 274 | 272 | 275 | 293 | 296 | 209 |
| 4. Edible Oil Seeds | | | | | | | | |
| (a) Rape & Mustard & Til | 112 | 128 | 150 | 151 | 156 | 163 | 163 | 112 |
| (b) Groundnut | 12 | 14 | 24 | 38 | 52 | 51 | 47 | 38 |
| (c) Total | 124 | 133 | 152 | 188 | 203 | 207 | 210 | 150 |
| 5. Potato | 395 | 486 | 591 | 701 | 786 | 857 | 849 | 741 |
| 6. Sugarcane | 6,231 | 7,550 | 8,070 | 7,589 | 7,429 | 7,418 | 7,598 | 5,686 |
| | | | | | | | | (thousand bales) |
| 7. Jute | 5,328 | 6,693 | 6,400 | 6,670 | 5,754 | 7,171 | 6,670 | 4,193 |
| 8. Mesta | n.a. | n.a. | n.a. | n.a. | n.a. | 220 | 131 | 93 |
| | | | | | | | | (million lbs.) |
| 9. Tea | 63 | 60 | 63 | 65 | 62 | 67 | 69 | 22 |
| 10. Tobacco | 61 | 83 | 83 | 86 | 86 | 85 | 86 | n.a. |

Source: Directorate of Agriculture, Ministry of Agriculture, 1972.