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AN ASSESSMENT OF THE AGRICULTURAL SECTOR IN BANGLADESH

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AN ASSESSMENT
OF
THE AGRICULTURAL SECTOR IN BANGLADESH

A REPORT OF CONSULTANCY

BY

E. BOYD WENNERGREN
UTAH STATE UNIVERSITY

WITH ASSISTANCE FROM:

CHARLES H. ANTHOLT
USAID/DHAKA

AND

MORRIS D. WHITAKER
UTAH STATE UNIVERSITY

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PREFACE

This assessment has been undertaken to provide guidance and a basis for USAID program assistance to Bangladesh in support of activities to improve the welfare of its people. In particular, the objective was to prescribe USAID program interventions which would be most appropriate during the next fifteen to twenty years. The assessment recounts the performance of the agricultural sector since independence and the progress of related areas of the economy which are of consequence to overall development. Included are descriptions of the natural and human resource base, the marketing system, the status of women, the public sector, donor programs, and the scientific base in agriculture. Emphasis is given to identifying both the positive factors which can assist sectoral development and the constraints which must be corrected. An overall development strategy based on increased agricultural productivity is proposed, along with specific recommendations for USAID programming within each of the elements of the strategy.

The assessment presents a descriptive summary of the status of the sector and provides a benchmark indication of progress during these twelve years since independence. Most data series used herein begin with fiscal year 1973. The analysis was limited to the post-independence period for two reasons. First,

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most of the important data series could not be extended backwards into the pre-Bangladesh period with an acceptable degree of accuracy. Second, independence brought a new set of institutions and policies to agriculture which were different from those existing in the region during the Pakistani era. The independence period has, therefore, been characterized by a different mix of constraints than prior years, which render the data sets for the two periods incompatible. Despite this, cursory treatement is given to the earlier period for selected items to provide a better historical perspective.

Heavy reliance was placed on secondary data sources since time and money resources precluded the generation of primary data or validation of the secondary data. Since Bangladesh is a widely studied nation, this did not present the serious data problems often encountered in many LDCs. Still, several of the important data series were either incomplete or had not been updated since the mid-1970s. The data for the assessment was collected and analyzed during calendar year 1982. The assessment was updated and final analysis completed during the early part of 1983. Data were obtained from government and international agencies, private institutions, donor representatives, and academic sources. The information was supplemented by personal interviews with BDG officials.

Bangaldesh is one of the few developing countries where development issues are not confounded by the pressures of regional and international politics and strategies. Bangladesh

has no strategic minerals or metals of interest to its neighbors or other nations. The nation is not located so as to play an important role in the military or geo-political strategies of various world powers. For the most part, Bangaldesh is a sovereign nation struggling to provide a reasonable standard of living for its people within a matrix of resource constraints which may be unique among LDCs. Its limited land base and large population set the stage for a developmental predicament which should attract the interest of serious students of development. As has been suggested elsewhere, Bangladesh is a good test case for development. Bangladesh represents a challenge to the concepts of development and to the ingenuity and political will of the nation and the donors which play an important role in its future. The challenge is formidable, but, given Bangladesh's excellent agricultural resource base, not unattainable.

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Support for the project was provided by the USAID Mission in Bangladesh. However, the viewpoints and conclusions, plus any errors or omissions are entirely my responsibility and do not reflect, necessarily, the attitude of USAID, the Government of Bangladesh, or Utah State University.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ADP	Annual Development Plan
AETI	Agricultural Extension Training Institute
AI	Artificial Insemination
ARCP	Agricultural Research Council of Pakistan
AFE	Academy for Fundamental Education
BAC	Bangladesh Agricultural College
BACE	Bangladesh Association for Community Education
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BARD	Bangladesh Academy of Rural Development
BARI	Bangladesh Agricultural Research Institute
BAU	Bangladesh Agricultural University
BB	Bangladesh Bank
BCCI	Bank of Credit and Commerce International
BCIC	Bangladesh Chemical Industries Corporation
BCPS	Bangladesh Contraceptive Prevalence Survey
BDG	People's Republic of Bangladesh Government
BEERI	Bangladesh Education, Extension, and Research Institute
BFDC	Bangladesh Fisheries Development Corporation
BFPA	Bangladesh Family Planning Association
BHB	Bangladesh Handloom Board
BHMC	Bangladesh Handicraft Marketing Corporation
BIWTC	Bangladesh Inland Water Transport Corporation
BIWTA	Bangladesh Inland Water Transport Authority
BJEC	Bangladesh Jute Export Corporation
BJMC	Bangladesh Jute Mille Corporation
BJRI	Bangladesh Jute Research Institute
BKB	Bangladesh Krishi Bank
BPDB	Bangladesh Power Development Board
BRB	Bangladesh Railway Board
BRRI	Bangladesh Rice Research Institute
BRTC	Bangladesh Road Transport Corporation
BSBL	Bangladesh Samabaya Bank Limited
BSFIC	Bangladesh Sugar and Food Industries Corporation
BSMC	Bangladesh Sugar Mills Corporation
BSCIC	Bangladesh Small and Cottage Industries Corporation
BTB	Bangladesh Tobacco Board
BTB	Bangladesh Tea Board
BTMC	Bangladesh Textile Mills Corporation
BTRI	Bangladesh Tea Research Institute
CARE	Cooperative for American Relief Everywhere
CIDA	The Canadian International Development Agency

CIP	International Potato Center
DAC	Development Assistance Committee of O.E.C.D.
DAEM	Directorate of Agricultural Extension and Management
DAP	Development Assistance Program
DLS	Directorate of Livestock Institution
DPI	Directorate of Public Institution
EEX	European Economic Community
ERD	External Resources Division
FFW	Food For Work
FP	Family Planning
FRG	Federal Republic of Germany
FRI	Forestry Research Institute
FTR	Fisheries Technological Research
FWC	Family Welfare Center
FWV	Family Welfare Visitors
GDP	Gross Domestic Product
GDR	German Democratic Republic
GEC(UK)	General Electric Company
HSC	Higher Secondary Certificate
HYV	High Yielding Varieties
IBRD	International Bank for Reconstruction and Development
ICB	Investment Corporation of Bangladesh
ICAR	Indian Center for Agricultural Research
ICDDRB	International Center for Diarrheal Disease Research, Bangladesh
ICPP	Intensive Crop Production Programs
ICRISAT	International Crop Research Institute for Semi-Arid Tropics
IDA	International Development Association
IDB	Islamic Development Bank
IEA	Institute for Educational Administration
IER	Institute for Education and Research
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFDC	International Fertilizer Development Center
IJCS	Intensive Jute Cultivation System
IMF	International Monitory Fund
INA	Institute of Nuclear Agriculture
IRDP	Integrated Rural Development Program
IRRI	International Rice Research Institute
IVA	International Voluntary Agencies
JEA	Jute Extension Assistant
JEO	Jute Extension Officer
JES	Jute Extension Service
JICA	Japan International Cooperative Agency
KSS	Krishi Samabaya Samity
LDCS	Less Developed Countries
LSD	Local Supply Depots
MCH	Maternal and Child Health
MEP	Minimum Export Price
MIDAS	Microindustries Development Assistance Society

MOA	Ministry of Agriculture
MOE	Ministry of Education
MOF	Ministry of Food
MOEMR	Ministry of Energy and Mineral Resources
MOC	Ministry of Communications
MOFP	Ministry of Finance and Planning
MOIC	Ministry of Industries and Commerce
MOSTI	Manually Operated Tube Well for Irrigation
M. Phil.	Master of Philosophy Degree
NBR	National Board of Revenue
NCB	Nationalized Commercial Banks
NES	National Extension Service
NGB(UK)	National & Grindlays Bank (UK)
NGO	Non Government Organization
NMDG	Netherlands Minister of Development Cooperation
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
PDP	Primary Distribution Points
PSI	Population Services International
PTI	Primary Training Institute
PVO	Private Volunteer Organizations
PPD	Plant Protection Directorate
RHD	Roads and Highways Department
SACP	Special Agricultural Credit Program
SFYP	Second Five Years Plan
SIDA	Swedish International Development Agency
SRTI	Sugarcane Research and Training Institute
SSC	Secondary School Certificate
TAO	Thana Agricultural Officer
TC	Transport and Communications
TCB	Trading Corporation of Bangladesh
TCCA	Thana Central Cooperative Association
THC	Thana Health Complex
TIP	Thana Irrigation Program
TTDC	Thana Training and Development Centers
TTC	Teachers Training College
TRI	Tea Research Institute
TPI	Tropical Products Institute
T&V	Training and Visitation
UAA	Union Agricultural Assistants
UAE	United Arab Emirates
UK	United Kingdom
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations International Childrens Emergency Fund
UN	United Nations
USA	United States of America
USSR	Union of Soviet Socialist Republic
VEA	Village Extension Agents
WARDA	West African Rice Development Association
WDB	Water Development Board
WES	Wage Earners Scheme

UNITS OF MEASUREMENT

1 Bigha	=	.33 acres
1 acre	=	.40468 hectares
1 hectare	=	2.4711 acres
1 long ton	=	2240 lb. = 27.2241 maunds
1 metric ton	=	2204.6 lbs.
1 ton	=	1000 kgs.
1 maund	=	82.29 lbs. = 37.3261 kgs.
1 seer	=	2.0573 lbs. = 0.9331 kgs.
1 crore	=	10 million
1 lakh	=	100,000

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AVERAGE EXCHANGE RATES, 1973 - 1982
(in Taka per U.S. $1.00)

1973 - 7.78	1978 - 15.12
1974 - 7.97	1979 - 15.22
1975 - 8.88	1980 - 15.48
1976 - 14.85	1980 - 16.34
1977 - 15.47	1982 - 19.89

SOURCES OF QUOTES AT BEGINNING OF CHAPTERS

Chapter 1. William H. Nicholls, "The Place of Agriculture in Economic Development," in Agriculture in Economic Development, ed. by Carl K. Eicher and Lawrence W. Witt (New York: McGraw Hill, 1964), p. 40.

Chapter 2. Yujiro Hayami and Vernon W. Ruttan, Agricultural Development: An International Perspective (Baltimore and London: The Johns Hopkins University Press, 1971), p. 101.

Chapter 3. Vernon W. Ruttan, Agricultural Research Policy (Minneapolis: University of Minnesota Press, 1982).

Chapter 4. Theodore W. Schultz, "Economic Dynamics of Agricultural Development," Public Lecture, Jakarta, Indonesia, November 7, 1980, p. 17, (Mimeograph.)

Chapter 5. Rounaq Jaban, "Political Participation of Women in the 1973 Election in Bangladesh," paper presented at the Annual Meeting of the Association of Asian Studies, Boston, 1974.

Chapter 6. Merle Faisod, "The Structure of Development Administration," in Development Administration--Concepts and Problems, ed. by Irving Swerdlow (Syracuse: Syracuse University Press, 1963), p. 1.

Chapter 7. Everett E. Hagen, "Public Administration and the Private Sector in Economic Development," in Development Administration--Concepts and Problems, ed. by Irving Swerdlow (Syracuse University Press, 1963), p. 126.

Chapter 8. Sterling Wortman and Ralph W. Cummings, Jr., To Feed This World (Baltimore: The Johns Hopkins University Press, 1978), p. 380.

Chapter 9. Aristotle, "Five Ways to Wisdom," Time Magazine, September 27, 1982, Vol. 120, No. 13, p. 66.

Chapter 10. M. Peter McPherson, Front Lines, March 1983, p. 3.

CHAPTER 1
BANGLADESH ECONOMIC DEVELOPMENT: THE ROLE AND PERFORMANCE OF THE AGRICULTURAL SECTOR

> ". . . until underdeveloped countries succeed in achieving and sustaining a reliable food surplus, they have not fulfilled the fundamental precondition for economic development."
>
> William H. Nicholls
> Vanderbilt University

General Background

Bangladesh became an independent nation in December 1971 in the aftermath of a ten-month war of liberation with West Pakistan. The prior unification of East and West Pakistan into one nation had been part of the partition of the region accompanying the withdrawal of British presence in 1947. Eventual polarization of policies and positions between the two regions culminated in open hostilities and finally separation. While independence brought Bangladesh freedom of self-determination, it also brought the new nation face to face with the realities associated with self-government and the 1971 crisis caused by the war.

The conditions confronting Bangladesh as it became a new nation are well known and documented.[1] Even then it was one of the world's most densely populated and impoverished countries. It was characterized by: (1) extremely low per capita income and relatively high population growth; (2) the literacy rate was low as was the education level; (3) the agricultural sector had low productivity and employed traditional technology; (4) the industrial base was small with practically no mineral assets; (5) the geography of the nation with its extensive rivers and flood plains made travel difficult, especially in combination with a totally inadequate transport, communication, and power infrastructure; and, (6) the nation faced chronic balance of payments problems.

Destruction of infrastructure and economic capability in the war presented a particularly difficult and immediate challenge for the newly formed Government of Bangladesh (BDG) and compounded the more pervasive, underlying problems restricting agricultural and economic development. The war damages have been

calculated by the UN Relief Operation in Dhaka at $1.2 billion, an estimated 21 percent of the 1972-73 Gross Domestic Product (GDP).[2] The hardest hit sectors were food production, housing, communications, and transport.

The complexity of the problems facing the new government was exacerbated by a devastating cyclone which struck in December 1970, leaving an estimated 350,000 dead and $180 million in damages. Reconstruction had been only partially addressed by the Pakistan Government and was abandoned totally at the beginning of the war, leaving the program obligations to be assumed by the new Bangladesh government.

Perhaps the most important and persistent impact of the war was its disruption of the administrative capacity of the government and the flight to West Pakistan of middle level managers and entrepreneurs from the public and private sector. Almost overnight the BDG faced the huge task of adminstering a national restructuring but without the benefit of adequate numbers of skilled and experienced administrators as freedom fighters and other political appointees replaced many civil servants in the new government. The task was made even more difficult by the government's philosophy favoring central control of the economy which resulted in the early nationalization of all major industries, banks, and insurance companies. The BDG also assumed control of a large number of public corporations and other enterprises formerly managed by the private sector. This orientation toward centralization, conditioned by the exodus of people from the private sector, magnified the need for qualified public administrators. The limited capability of the government to provide this critical input was debilitating then and has been a persistent constraint to development through the years.

The commitment to central control of the economy, the need to reconstruct the nation's infrastructure and economic viability, and the early recognition and acceptance of the government's responsibility to provide adequate food for a large and growing population have set the tone for public policy during the first decade of Bangladesh's existence. Food security has been an especially dominant policy focus.

This brief resume of the very difficult conditions under which the government of Bangladesh began its developmental efforts is a necessary backdrop for assessing the agricultural sector. What follows is an account of progress since independence and a description of issues which must be addressed and resolved if further progress is to be made.

In Chapter 1, the overall performance of the economy of Bangladesh and the contributions of the agricultural sector to general economic development are reviewed. The chapter is grounded in the current development thought that agricultural growth and development are fundamental to general economic progress in those countries with a relatively large share of their population employed in traditional agriculture. Relevant

factors here are: (1) the growth of both agriculture and the general economy; (2) the trade balance and agriculture's role in import demand and export earnings; (3) the degree to which agriculture has provided adequate nutrition for the populace; (4) the demand for nonfarm products by rural residents to support the broadening and deepening of the development process; and (5) the nature and structure of the agricultural labor market including the sector's capability to provide adequate labor for agricultural production while permitting the efficient flow of people to nonagricultural employment.

Growth Rates and Sectoral Performance

Bangladesh is predominantely an agricultural economy. The traditional farm sector encompasses a large segment of the population which engages in subsistance production and consumption. Low-level technology characterizes most small land holdings. Rice production dominates the sectoral output and is typically grown in three seasons or crops; (1) Aman (planted in the June monsoon season and harvested November-January); (2) Aus (planted March-April and harvested July-August), and (3) Boro (planted in December-February and harvested April-June).

Gross Domestic Product

Growth of the economy since 1973 has been relatively strong, given the difficult problems faced by the new government at the beginning of the decade (Table 1.1 and 1.2)[3] The growth trend has been persistently upward, although increases have not been dramatic. The overall real annual average growth in Gross Domestic Product (GDP) for 1973-81 was 5.9 percent (Table 1.3).

The estimate of overall growth is reduced to 5.5 percent per year if the period of analysis is changed to 1974-81. Given the lower and distorted production levels for 1973 associated with recovery from the war, 1974 may be a much more realistic base from which to judge comparative annual growth of the economy.

Growth was uneven during the period. From 1973-77, the GDP increased at 7.3 percent annually, while the growth from 1978-81 was only 4.6 percent. The lower growth rate for the more recent years is discouraging, but the performance levels for these years may be more indicative of what is currently occurring in the economy. The World Bank has estimated the 1981 increase in GDP at 3.4 percent while the Bangladesh Bureau of Statistics estimate for the same year was 4.8 percent.[4]

The rapid growth in population has negated the effect of much of the improvement in production that has occurred since 1973. In current prices, the per capita GDP in 1981 rose to Tk. 2,016 which is approximately U.S. $120 per year.[5] This places

TABLE 1.1
Gross Domestic Product by Industrial Origin Bangladesh, 1973-81 (in current market prices; millions of taka)

	Fiscal Year[a]								
	1973	1974	1975	1976	1977	1978	1979	1980	1981
Agriculture	**26100**	**41501**	**78623**	**57339**	**53671**	**72248**	**78745**	**93299**	**95434**
Crops	19761	33215	67401	45114	40172	53494	56604	68443	70113
Forestry	1240	1728	2311	2094	2112	4064	4754	4860	5848
Livestock	2230	3137	4137	4332	4494	7774	10501	12998	12451
Fisheries	2869	3421	4774	5799	6893	6916	6886	6998	7022
Industry	**4555**	**7285**	**14174**	**13878**	**14700**	**15805**	**17809**	**22171**	**26745**
Mining and manufacturing	2896	4267	8378	8175	8662	9405	10317	12513	15011
(Large- and medium-scale manufacturing)	(1870)	(2788)	(4632)	(4519)	(4787)	(5298)	(5812)	(7051)	(8459)
(Small-scale manufacturing)[b]	(1026)	(1479)	(3746)	(3656)	(3875)	(4107)	(4505)	(5462)	(6552)
Construction	1529	2899	5665	5514	5807	6155	7232	9289	11301
Electricity, gas, and water	130	119	131	189	231	245	260	369	433
Services	**14457**	**22300**	**32944**	**36241**	**36990**	**42237**	**48220**	**56980**	**72468**
Transport and communications	3366	4368	5642	6633	7334	8819	9547	11521	18331
Trade	3829	6508	10982	10747	10384	12832	15634	19048	20808
Banking and insurance	559	653	1011	974	1002	1034	1454	1833	2024
Housing	2454	4090	7352	8945	8024	8249	9338	11464	14077
Other services	3300	4878	5486	6122	6896	7846	8680	8883	9090
Public administration and defense[c]	949	1803	2461	2820	3350	3457	3567	4231	8138
Gross Domestic Product, at market prices	**45112**	**71086**	**125741**	**107458**	**105361**	**130290**	**144774**	**172450**	**194547**
Net indirect taxes	1061	2109	1792	6065	5720	6929	8142	11083	13464
Gross Domestic Product, at factor cost	**44051**	**68977**	**123949**	**101393**	**99641**	**123361**	**136632**	**161367**	**181183**
Population (millions)	74.3	76.4	78.0	79.9	81.8	83.7	85.6	87.7	89.9
GDP per capita (Taka)	593	903	1589	1269	1218	1474	1596	1840	2016

Sources: Bangladesh Bureau of Statistics, **Economic Indicators of Bangladesh**, Report No. 1, January 1982; World Bank, Report No. 3768-BD, March 3, 1982, p. 186), and Report No. 4277-BD, March 4, 1983, p. 113; Bangladesh Bureau of Statistics, **1980 Statistical Yearbook of Bangladesh**, p. 132.

[a] Fiscal year. For example, 1973 is July 1, 1972 through June 30, 1973.
[b] Includes mining and quarrying.
[c] Estimates for 1973 through 1980 are not directly comparable with those of subsequent years, as wages and salaries paid out of central government's ADP were not included in estimates of sectoral value added prior to 1981.

TABLE 1.2
Gross Domestic Product by Industrial Origin Bangladesh, 1973-81 (in constant market prices of 1973; millions of taka)

	Fiscal Year[a]								
	1973	1974	1975	1976	1977	1978	1979	1980	1981
Agriculture	**26100**	**28827**	**28537**	**31865**	**30903**	**34019**	**33872**	**33909**	**35762**
Crops	19761	22352	22212	25477	24461	26450	26941	26841	28481
Forestry	1240	1330	1134	1183	1183	1490	1520	1579	1703
Livestock	2230	2267	2303	2326	2380	3166	3308	3392	3477
Fisheries	2869	2878	2888	2879	2879	2913	2103	2097	2101
Industry	**4555**	**5212**	**7401**	**7755**	**8338**	**9014**	**9510**	**9744**	**10378**
Mining and manufacturing	2896	3404	5482	5878	6118	6642	6939	6954	7490
(Large- and medium-scale manufacturing)	(1870)	(2225)	(3031)	(3258)	(3381)	(3742)	(3967)	(3976)	(4303)
(Small-scale manufacturing)[a]	(1026)	(1179)	(2451)	(2620)	(2737)	(2900)	(2972)	(2978)	(3187)
Construction	1529	1713	1833	1742	2057	2188	2387	2540	2622
Electricity, gas, and water	130	95	86	135	163	184	184	250	266
Services	**14457**	**16530**	**16344**	**19066**	**20228**	**20949**	**23384**	**25557**	**27183**
Transport and communications	3366	3528	3617	3792	4095	4258	4612	4715	4845
Trade	3829	5142	5814	7653	7907	8008	9373	10972	11196
Banking and insurance	559	469	450	465	475	506	545	623	629
Housing	2454	2417	2383	2529	2585	2740	3082	3154	3232
Other services	3300	3678	2841	3281	3577	3756	3994	4266	4548
Public administration and defense[b]	949	1296	1239	1346	1589	1681	1778	1827	2733
Gross Domestic Product, at market prices	**45112**	**50569**	**52282**	**58686**	**59469**	**63982**	**66765**	**69210**	**73323**
Net indirect taxes	1061	1496	747	3314	3232	3396	3756	4451	5081
Gross Domestic Product, at factor cost	**44051**	**49073**	**51535**	**55372**	**56237**	**60586**	**63010**	**64759**	**68242**
Population (millions)	74.3	76.4	78.0	79.9	81.8	83.7	85.6	87.7	89.9
GDP per capita (taka)	593	642	661	693	688	724	736	738	767
Annual change GDP (%)	--	11.4	5.0	7.4	1.6	7.7	4.0	2.8	5.4
Annual change GDP/capita (%)	--	8.4	3.0	4.8	(-0.7)	5.2	1.7	0.3	5.5
Agriculture GDP/capita (taka)	351	377	366	399	378	406	396	386	398

Sources: Bangladesh Bureau of Statistics, **Economic Indicators of Bangladesh**, Report No. 1, January 1982; World Bank, Report No. 3760-BD, March 3, 1982, p. 186, and Report No. 4277-BD, March 4, 1983, p. 114; Bangladesh Bureau of Statistics, **1980 Statistical Year Book of Bangladesh**, p. 132.

[a]Fiscal year. For example, 1973 is July 1, 1972 through June 30, 1973.
[b]Includes mining and quarry.

TABLE 1.3
Average Annual Growth Rates in Total and Per Capita Gross Domestic Product, Bangladesh, 1973-81
(constant 1973 market prices)

Sector	Benchmark 1973 (mill. of Taka)	Annual Compound Growth 1973-77	1978-81	1973-81
		------(percentage)-------		
Agriculture	**26100**	**4.5**	**1.5**	**3.7**
Crops	19761	5.7	2.2	4.1
Other ag.	6339	0.2	(-1.0)	2.0
Industry	**4555**	**17.4**	**4.6**	**10.2**
Mining & manuf.	2896	22.7	3.7	11.5
Construction	1529	6.3	6.2	7.1
Electricity & gas	130	8.4	15.2	13.5
Services	**14457**	**8.5**	**9.1**	**8.1**
Transp. & commun.	3366	4.8	4.2	5.0
Trade	3829	20.3	12.3	13.4
Banking & insurance	559	(-3.3)	8.2	3.0
Housing	2454	1.5	5.3	4.2
Public admin.	949	11.3	16.0	10.9
Other services	3300	0.5	6.6	4.3
GDP (total)	45112	7.3	4.6	5.9
Per capita GDP (taka)	593	3.8	1.8	2.9
Per capita ag. GDP (taka)	351	2.1	(-0.8)	1.3

Using 1974 as base year:	1974-77	1974-81
Annual growth in total GDP	6.2	5.5
Annual growth in agricultural GDP	3.2	3.2
Annual growth in per capita GDP	2.6	2.4
Annual growth in per capita ag. GDP	0.1	0.8

Source: Calculated from Table 1.2. Rates of growth calculated by fitting trend line by least-squares method.

Bangladesh among the lowest 2 or 3 nations worldwide. In real terms, per capita GDP grew an average of 2.9 percent since 1973, but annual growth since 1978 has been only 1.8 percent.

Agricultural Sector

The GDP for Bangladesh is dominated by agricultural production (Table 1.4). In 1973, the agricultural sector represented 57.9 percent of the total GDP. The percentage has continually declined as the rest of the economy has grown more rapidly than agriculture, but still agriculture accounted for 49 percent of the GDP in 1981. Within agriculture, crops accounted for 73 percent of total agricultural production and 36 percent of the nation's GDP in 1981. The sectoral share of agriculture showed a significant decline between 1980 and 1981 despite a rise in agricultural output. The reduction was due to greater relative increases in output by the other sectors, primarily services. The services sector grew by 27 percent, but some portion of the increase was due also to the inclusion for the first time, of salaries and wages paid by the BDG from the ADP as part of the sector's value added [See footnote (c), Table 1.1].

The performance of agriculture since 1973 has been relatively good by historical standards but still is inadequate to meet the demand generated by burgeoning population growth and modest increases in real per capita GDP. Moreover, the situation seems to have deteriorated slightly in recent years.

For the period 1973-81, the agricultural sector grew at the average annual rate of 3.7 percent on a 1973 base and a 3.2 percent on a 1974 base (Table 1.3). Both rates are relatively high by either historical or contemporary standards for a developing country and are especially noteworthy given the difficulties Bangladesh faced in rising to independence as a nation.[6] But when judged in light of growth in demand, it appears that demand has grown more rapidly than domestic production. Given the rates of growth of per capita GDP of 2.9 percent for the period, and assuming an income elasticity of demand for food of 0.5, the demand for food from increased GDP (income) grew at 1.5 percent per year. This, added to a population growth rate of 2.5 percent results in a growth of demand for food approximating 4.0 percent per year for the period.[7] The disparity of 0.3 percent between growth in agricultural production of 3.7 percent and growth in demand for food of 4.0 percent was relatively modest, but, even so, production was deficient.

The disparity between agricultural production and demand for food seems to have worsened in recent years. Agricultural growth has followed the same general trend as the GDP with a lower growth rate since 1978 of only 1.5 percent per year. Since population growth has remained relatively constant at a 2.5 percent average agricultural production (GDP) per capita,

TABLE 1.4
Sectoral Shares of Gross Domestic Product Bangladesh, 1973-81 (in current prices)

Sector	Fiscal Years								
	1973	1974	1975	1976	1977	1978	1979	1980	1981
	Percentage								
Agriculture	**57.9**	**58.3**	**62.5**	**53.4**	**50.9**	**55.5**	**54.4**	**54.0**	**49.0**
Crops	43.8	46.7	53.6	42.1	38.1	41.1	39.1	39.6	36.0
Forestry	2.8	2.4	1.8	1.9	2.0	3.1	3.3	2.8	3.0
Livestock	4.9	4.4	3.3	4.0	4.3	6.0	7.2	7.5	6.4
Fisheries	6.4	4.8	3.8	5.4	6.5	5.3	4.8	4.1	3.6
Industry	**10.1**	**10.3**	**11.3**	**12.9**	**13.9**	**12.1**	**12.3**	**12.9**	**13.7**
Mining & mfg.	6.4	6.0	6.7	7.6	8.2	7.2	7.1	7.3	7.7
Construction	3.4	4.1	4.5	5.1	5.5	4.7	5.0	5.4	5.8
Electricity & gas	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Services	**32.0**	**31.4**	**26.2**	**33.7**	**35.2**	**32.4**	**33.3**	**33.1**	**37.3**
Transpt. & comm.	7.5	6.1	4.5	6.2	7.0	6.8	6.6	6.7	9.4
Trade	8.5	9.2	8.7	10.0	9.9	9.8	10.8	11.0	10.7
Banking & ins.	1.2	0.9	0.8	0.9	1.0	0.8	1.0	1.1	1.0
Housing	5.4	5.8	5.8	8.3	7.6	6.3	6.4	6.6	7.3
Other services	7.3	6.9	4.4	5.7	6.5	6.0	6.0	5.2	4.7
Public admin.	2.1	2.5	2.0	2.6	3.2	2.7	2.5	2.5	4.2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Calculated from TABLE 1.2.

actually declined slightly for the period 1978-81. The gap between the demand for food and domestic agricultural production during 1978-81--an estimated 1.9 percent--was substantially greater than the average deficit of 0.3 percent for the period 1973-81.[8] In fact, the gap between the rate of growth in demand for food, and domestic production appears to have widened significantly between 1973-77 and 1978-81.

The progress that has occurred in agriculture presents an interesting time series pattern. Agricultural production grew moderately in 1974 but showed declines in 1975, 1977, and 1979 from the previous years due to unfavorable weather and floods (Table 1.2). A spurt in production occurred in 1978 and the level has generally been maintained through 1981, likely the result of increased plantings and yields of wheat.

Favorable weather plus the increased use of fertilizer, high yielding varieties (HYVs), and other modern factors of production resulted in a record crop harvest in 1981 and an increase of 5.5 percent over 1980 in the GDP for agriculture. However, preliminary estimates indicate slight declines in agricultural production in 1982 mainly related to poor weather. Much of the variation in agricultural GDP can be traced to adverse weather. More than any other single variable, weather determines the outcome of annual production efforts.

Practically all of the increases in agricultural production have been associated with crop production which, historically, has represented from 75 to 80 percent of agriculture's GDP. Crops grew at an annual rate of 4.1 percent during 1973-81 which is slightly above the likely demand. Aside from food crops, other agricultural production (livestock, forestry, and fisheries) grew only at the annual rate of 2.0 percent for the period, and actually declined from 1978-81.

The limited overall performance of the agricultural sector conceals some important improvements in production of specific crops.[9] For example, since 1973 wheat production rose eightfold due to the adoption of high yielding varieties and increased use of fertilizer and irrigation. Potato production has shown a significant increase since 1977. Boro rice production has also reached new highs since 1980, and mustard production during the same period has shown significant growth.

Other Sectors

Other sectors of the economy are much smaller than agriculture. The services sector contributed 37.3 percent to the total GDP in 1981 and grew at an annual rate of 8.1 percent between 1973-81. The remaining 13.7 percent of the total GDP came from the industrial sector which grew at the rate of 10.2 percent (Tables 1.3 and 1.4).

Several nonagricultural subsectors have shown high growth rates during the past decade. The trade subsector grew at an

annual rate of 13.4 percent from 1973-81. Mining and manufacturing also grew rapidly. The subsector with the lowest growth rate was banking and insurance, and its GDP actually declined for the period 1973-77. Interestingly, this was the first sector nationalized by the new government.

Despite the growth of some nonagricultural subsectors, relative changes in the composition of the GDP have been slow (Table 1.4). Agriculture has declined in importance about 8 percent in eight years while the industrial and services sectors have increased in equivalent amount. This, of course, is the intersectoral pattern that normally emerges as development occurs. But an average shift of 1.0 percent per year is slow. The seemingly impressive rates of growth of several nonagricultural subsectors are each on a relatively small base, so increases in each subsector's share of GDP are small.

Trade Balance and Foreign Exchange

Bangladesh faces a difficult foreign trade situation. Like many developing nations, it is dependent on imports for numerous items important to its welfare, including foodgrains, but lacks an expansive export base. Bangladesh is one of the least industrialized nations in the world and, to a considerable extent, the development and maintenance of significant portions of its meager industrial base depend on imported materials. With only limited nonrenewable natural resources (natural gas being the major exception), Bangladesh has been constantly pressured to generate sufficient export credits to support its import needs.

Bangladesh has faced a chronic balance of payments problem. Since 1973 the balance on current account has been negative each year and the trend has generally been toward an increasing deficit (Table 1.5). The deficit has risen from $361 million in 1973 to $1,379 million in 1982.[10] In 1980, the deficit was a record $1,434 million which was also the first year it reached the $1.0 billion level. The 1982 deficit was down slightly from 1981. The projections are that Bangladesh will continue with a deficit in excess of $1.0 billion for several years.

Imports

Total imports have risen consistently since 1973, which has placed increasing pressure on the balance of payments. Yet, the rising deficit on current account seems to be caused principally by deficiencies in the export sector. The value of total imports increased from $727 million in 1973 to $2.5 billion in 1981 (Table 1.6). Imports in 1982 fell slightly to $2.3 billion. The volume of imports, as measured in constant prices of 1973, has

TABLE 1.5
Balance of Payments, Bangladesh, 1973-1982 (in million U.S. dollars)

	Fiscal Year									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Merchandise exports, fob	354	370	344	372	405	490	610	724	711	625
Merchandise imports, cif	-727	-925	-1402	-1266	-865	-1349	-1556	-2372	-2533	-2328
Trade Balance	**-373**	**-555**	**-1058**	**-894**	**-460**	**-859**	**-946**	**-1648**	**-1822**	**-1703**
Nonfactor services, net	**-21**	**-33**	**26**	**12**	**2**	*****	**-5**	**-10**	**38**	**14**
Nonfactor services, receipts	35	34	83	63	59	82	114	163	222	214
Nonfactor services, payments	-55	-68	-56	-51	-57	-82	-119	-173	-185	-200
Investment income, net	**-1**	**5**	**-5**	**-17**	**-31**	**-32**	**-22**	**14**	**-23**	**-74**
Investment income, receipts	#	13	13	16	25	27	42	92	52	33
Investment income, payments	-1	-8	-19	-33	-56	-59	-64	-77	-75	-107
(Interest on external public M & LT debt)	(--)	(-7)	(-10)	(-22)	(-28)	(-32)	(-38)	(-43)	(-42)	(-46)
Private unrequited transfers, net	**33**	**19**	**35**	**29**	**60**	**113**	**143**	**210**	**379**	**384**
Private unrequited transfers, receipts	(#)	(20)	(35)	(30)	(61)	(113)	(143)	(210)	(379)	(385)
Private unrequited transfers, payments	(#)	(-1)	(*)	(-1)	(*)	(*)	(-1)	(*)	(*)	(-1)
Current Account Balance	**-361**	**-564**	**-1003**	**-870**	**-429**	**-778**	**-831**	**-1434**	**-1428**	**-1379**
Amortization of public M & LT debt	-1	-11	-21	-66	-30	-37	-57	-50	-50	-41
Use of IMF credit, net	75	35	65	86	-9	-27	-43	21	155	49
Aid disbursements, total	551	461	901	808	533	828	1030	1222	1147	1236
(Food aid)	(183)	(229)	(382)	(314)	(122)	(179)	(179)	(375)	(194)	(231)
(Commodity aid)	(289)	(108)	(376)	(369)	(253)	(374)	(483)	(378)	(393)	(421)
(Project aid)	(80)	(124)	(143)	(126)	(159)	(276)	(368)	(470)	(560)	(584)
Other long-term capital, net	#	#	#	7	14	23	12	11	19	20
Short-term capital, net	#	26	-26	-19	-18	-57	-45	33	12	33
Liabilities constituting foreign authorities' reserves, net	--	--	21	-1	-20	25	--	21	91	18
Exceptional financing	--	--	--	--	3	28	41	85	10	6
Counterpart items	--	--	--	--	--	--	20	21	20	--
Other items	--	--	--	--	1	6	2	7	8	--
(Distribution of IMF gold sale profits, net)	(--)	(--)	(--)	(--)	(--)	(5)	(1)	(6)	(8)	(--)
(Restitution of gold by IMF)	(--)	(--)	(--)	(--)	(1)	(1)	(1)	(1)	(--)	(--)
Errors & omissions[c]	-286	-5	214	1	36	-36	-4	-57	-7	-70
Change in reserves[b] (- = increase)	21	58	-151	53	-81	25	-124	119	24	128
Memorandum Items:										
Reserve level, end of June[c] (million U.S.$)	173	115	266	213	294	269	393	274	250	121
Average annual exchange rate (taka/U.S.$)	7.7808	7.9661	8.8759	14.8521	15.4667	15.1215	15.2228	15.4777	16.3447	20.0400

Source: World Bank, Report No. 4277, dated March 4, 1983, p. 120.

* = less than U.S.$0.5 million. # = not separately available.

[a]Including effect of valuation changes. [b]Including changes in the valuation of reserves. [c]Including gold (national valuation).

TABLE 1.6
Merchandise Imports, Bangladesh, 1973-82

	Fiscal Year									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Foodgrains										
Value (mill. U.S. $)	320.8	332.9	544.1	366.2	146.8	235.6	197.0	623.0	250.4	285.0
Quantity--Rice (1000 tons)	390.0	82.0	266.0	396.0	192.0	304.0	55.0	712.0	82.0	142.0
--Wheat (1000 tons)	2435.0	1534.0	2202.0	1040.0	603.0	1341.0	1119.0	2070.0	974.6	1094.0
Value in constant prices[b] (m. U.S. $)	320.8	185.7	258.8	168.9	93.9	188.9	121.5	323.9	118.2	129.5
Edible oil										
Value (mill. U.S. $)	--	11.3	37.9	40.4	26.5	48.3	61.9	68.0	92.0	71.0
Quantity (1000 tons)	--	17.0	49.0	61.0	41.0	71.0	70.0	78.0	141.0	109.0
Value in constant prices[b] (m. U.S. $)	--	6.6	19.1	23.8	16.0	27.7	27.3	30.4	49.4	34.2
Crude petroleum										
Value (mill. U.S. $)	17.5	20.7	98.7	75.1	106.3	125.0	119.0	257.3	343.6	333.6
Quantity (1000 tons)	729.0	346.0	819.0	842.0	1032.0	1155.0	958.0	1277.7	1304.7	1177.9
Value in constant prices[b] (m. U.S. $)	17.5	8.3	19.7	20.2	24.8	27.7	23.0	30.7	31.3	28.3
Petroleum products										
Value (mill. U.S. $)	5.7	63.1	56.6	51.1	34.6	40.7	60.0	115.6	146.5	209.5
Quantity (1000 tons)	130.0	731.0	449.0	404.0	285.0	323.0	381.0	451.8	500.3	573.9
Value in constant prices[b] (m. U.S. $)	5.7	32.0	19.7	17.7	12.5	14.1	16.7	19.8	21.9	25.1
Fertilizer										
Value (mill. U.S. $)	28.0	21.0	86.1	88.1	5.8	71.7	134.2	133.6	104.0	104.4
Quantity (1000 tons)	239.9	146.8	229.3	327.1	41.1	405.9	614.1	564.4	355.6	457.2
Value in constant prices[b] (m. U.S. $)	28.0	17.2	26.8	38.3	4.8	47.5	71.9	66.0	40.9	53.4
Cement										
Value (mill. U.S. $)	7.0	5.0	24.6	10.4	9.5	19.5	26.0	36.4	32.8	30.0
Quantity (1000 tons)	318.0	115.0	328.0	222.0	211.0	392.0	444.0	489.0	446.0	417.7
Value in constant prices[b] (m. U.S. $)	7.0	2.5	7.2	4.9	4.6	8.6	9.8	10.8	9.8	9.2
Raw Cotton										
Value (mill. U.S. $)	41.8	47.3	66.2	44.6	66.2	46.4	65.0	53.0	108.0	79.0
Quantity (1000 bales)	239.0	142.0	200.0	183.0	200.0	154.0	212.0	168.0	256.0	187.0
Value in constant prices[b] (m. U.S. $)	41.8	24.9	35.0	32.0	35.0	27.0	37.1	29.4	44.8	32.7
Cotton Yarn										
Value (mill. U.S. $)	13.6	43.3	5.6	2.8	12.8	20.2	10.0	11.0	20.0	22.0
Quantity (1000 bales)	44.0	69.0	7.0	3.0	18.0	36.0	8.0	7.2	14.0	10.0
Value in constant prices[b] (m. U.S. $)	13.6	21.4	2.2	0.9	5.6	11.2	2.5	2.2	4.3	3.6
Textiles										
Value (mill. U.S. $)	++	18.5	9.1	15.8	11.6	21.4	27.0	34.0	36.0	24.0
Value in constant prices[b] (m. U.S. $)	++	9.5	4.0	6.1	5.5	12.2	8.3	9.2	9.0	5.7
Capital Goods										
Value (mill. U.S. $)	100.0	128.5	135.0	213.3	227.3	318.0	389.0	475.0	665.0	602.0
Value in constant prices[b] (m. U.S. $)	100.0	105.5	93.4	137.0	138.8	170.9	179.8	194.2	276.3	235.0
Other Intermediate and Consumer Goods										
Value (mill. U.S. $)	192.6	233.4	338.5	357.9	214.2	402.0	467.1	565.1	734.7	567.5
Value in constant prices[b] (m. U.S. $)	192.6	191.6	234.1	229.9	130.8	216.1	215.0	224.5	316.9	228.2

Total Imports (mill. U.S. $)	**727.0**	**925.0**	**1402.4**	**1265.7**	**864.6**	**1349.0**	**1556.2**	**2352.0**	**2533.0**	**2328.0**
Total in constant prices[b] (m. U.S. $)	727.0	605.2	720.0	679.7	472.3	751.9	713.8	947.6	922.8	841.8
Implicit Import Price Index (1973 = 100)	100.0	152.8	194.8	186.2	183.1	179.4	218.0	250.3	274.5	276.5

Source: World Bank, Report No. 4277, dated March 4, 1983, p. 125.

++ = Not available.

[a]As a large portion of food imports is aid-financed, unit prices are not available except for accounting purposes. The unit prices shown for 1973 are estimates.

[b]All values in constant prices are expressed in prices of 1973.

[c]Estimate, for purposes of calculating value in constant prices.

[d]Does not include crude oil shipped to and refined in Singapore for the account of BDG.

increased at an average annual rate of 2.5 percent, approximately equal to the rate of growth of the population.

Thus, per capita imports in Bangladesh have remained relatively constant during the last decade. Furthermore, the level of imports per capita is modest when compared with those of some other developing nations. In 1980, for example, per capita imports to Bangladesh were about $27. By comparison for the same year, Chad had per capita imports of $27, Benin's imports were $77, and in Sri Lanka they amounted to $98 per capita.[11] Obviously, a nation's capacity to import is related to its ability to earn foreign exchange. Bangladesh's increasing trade imbalance appears to rest more with deficiencies and stagnation in exports than with excessive imports.

Imports comprise a relatively limited set of goods and services. Rice and wheat imports (both commercially and donor-provided) fill the gap between domestic production and demand and are critical to Bangladesh's food security. The level of food imports fluctuates substantially from year to year reflecting the vagaries of weather and other natural phenomena. Edible oil is the other principal food product imported into Bangladesh. Fertilizer is the major imported agricultural input and, like foodgrains, the amount varies from year to year depending on weather, prices, and domestic production of fertilizer. There has been a general trend toward increased fertilizer imports which reflects more intensive land cultivation. However, once the domestic production capacity for fertilizer currently under construction is fully operative, imports of urea will no longer be necessary. Other agricultural imports include raw cotton and cotton yarns which are manufactured into textiles.

The importance of imported foodgrain and other agricultural products in the balance of payments deficit has been declining in recent years. Since 1977, foodgrains have represented less than 20 percent of the total value of imports each year, except for 1980 (Table 1.7). In 1981, only 10 percent of the value of total imports was for foodgrains. Other traditional agricultural imports[12] have ranged from 12 percent to 17 percent of the value of total imports since 1973. In composite, agricultural imports (foodgrains plus all others) have declined from over one-half of the value of all imports during 1973-75 to about one third during 1977-79. They were only 24 percent in 1981 and 26 percent in 1982.

The most important import obligations of Bangladesh come from items classified as intermediate and consumer products, and capital goods. In the early 1970s, these two categories accounted for approximately 40 percent of the value of total imports, but since 1976 have increased to about 50 percent. The most dramatic change in the value of imports, however, has been in crude petroleum and petroleum products. These imports have shown a consistent rise in value, due both to modest increases in quantities and rapid price increases. In 1982, they were 23

TABLE 1.7
Relative Importance of Imports, Bangladesh, 1973-82 (based on current prices; as percentage of total imports)

Fiscal Year	Food Grains	All Other Traditional Agriculture	Int. & Consumer Goods	Capital Goods	Crude Petroleum	Petro Products	Cement	Total Imports (M. U.S. $)
1973	44	12	26	14	2	1	1	727.0
1974	36	15	25	14	2	7	1	925.0
1975	39	14	24	10	7	4	2	1402.4
1976	29	15	28	17	6	4	1	1265.7
1977	17	15	25	26	12	3	1	864.6
1978	17	16	30	24	9	3	1	1341.0
1979	13	17	30	26	8	4	2	1556.2
1980	26	13	24	20	11	5	2	2352.0
1981	10	14	32	23	14	6	1	2533.0
1982	12	14	24	26	14	9	1	2328.0

Source: Calculated from TABLE 1.6.

percent of the total imports, up from 3 percent in 1973. Their cost approximated 87 percent of all export earnings for the same year.

Exports

Historically, agricultural exports have been extremely important as a foreign exchange earner in Bangladesh. In more recent years, other limited nonagricultural export potentials have been found, but agricultural products still earn the bulk of export income.

The export picture in Bangladesh is bleak and, as suggested earlier, is a principal factor in the balance of payments problem. Exports, since 1973, have doubled in value, but have shown very little improvement in volume (Table 1.8). Traditional agricultural products constitute the large majority of total exports, with raw jute and jute products accounting for 61 percent of the total value in 1982. With tea added, these three agricultural products amounted to 67 percent of all exports. This is slightly less than earlier years, due mainly to a more rapid expansion in the export of other products. Leather, hides and skins, and fish and shrimp have shown considerable export growth, especially since 1977, and now exceed the value of tea exports. Even so, the volumes are not large.

Bangladesh trades with most regions and nations of the world. In 1980, the United States was Bangladesh's major trading partner, receiving 14 percent of its exports and providing 16 percent of its imports. Regionally, Europe is its most important trader followed by the nations of the Middle East.

Reliance on monocrop agricultural production and products of nature as the basis of export activities creates a highly unstable trade base for Bangladesh. Production from these sources is susceptible to the capriciousness of nature. Perhaps of even greater consequence is the susceptibility of these products to fluctuations in world market prices. Primary products historically suffer wide fluctuations in prices as supply and demand conditions are altered by a wide variety of world conditions, most of which are beyond the control of the producing country. The case of raw jute is especially cogent given its importance for Bangladesh. Both quantities exported and prices have demonstrated considerable annual fluctuations since 1973 (Table 1.8 and 1.9). The volume of raw jute exports has fallen about 35 percent between 1973 and 1982, and the value of raw jute is down, especially since 1979. Fortunately, the export volume of both jute goods and tea have not fallen victim to the same international market forces. Their export performance has kept the nation from experiencing even greater exchange deficits, but the uncertainties associated with reliance on primary agricultural exports continue.

TABLE 1.8
Merchandise Exports, Bangladesh, 1973-82

	Fiscal Year									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Raw Jute										
Value (mill. U.S. $)	133.8	128.4	82.9	123.7	114.1	96.2	143.1	143.5	118.9	101.7
Value in constant prices[a] (m. U.S. $)	133.8	126.1	73.3	111.1	107.8	78.9	93.2	93.2	92.1	90.6
Jute Goods[b]										
Value (mill. U.S. $)	186.1	199.2	209.4	187.1	179.9	246.9	275.8	384.4	352.9	291.0
Value in constant prices[a] (m. U.S. $)	186.1	198.1	171.2	198.5	205.0	236.1	207.2	199.0	223.1	244.6
Tea										
Value (mill. U.S. $)	9.7	14.7	21.5	17.4	36.1	44.9	40.8	33.0	40.7	37.8
Value in constant prices[a] (m. U.S. $)	9.7	10.3	11.2	10.7	14.0	13.7	13.0	11.4	14.2	14.9
Leather, Hides, and Skins[c]										
Value (mill. U.S. $)	16.2	15.9	24.3	30.2	38.0	45.0	75.4	65.6	56.7	64.3
Value in constant prices[a] (m. U.S. $)	16.2	13.1	21.4	24.3	23.7	25.2	29.8	26.2	27.0	26.6
Fish and Shrimp										
Value (mill. U.S. $)	4.5	7.9	4.0	11.6	17.4	20.3	36.0	39.4	41.9	52.6
Value in constant prices[a] (m. U.S. $)	4.5	6.7	2.4	5.5	6.5	7.9	10.6	10.1	12.5	25.4
Others										
Value (mill. U.S. $)	5.0	7.8	10.2	11.4	25.1	36.4	38.6	60.8	99.7	78.0
Value in constant prices[a] (m. U.S. $)	5.0	6.4	5.8	5.9	10.3	21.5	10.2	21.8	29.1	22.4
Total Exports (mill. U.S. $)	**355.3**	**373.9**	**352.3**	**381.4**	**410.6**	**489.7**	**609.7**	**726.7**	**710.8**	**625.4**
Total in constant prices[a] (m. U.S. $)	355.3	360.7	285.3	356.0	367.3	383.4	364.0	361.7	398.0	424.5
Memorandum Items:										
Traditional exports[d] value (m. U.S. $)	329.6	342.3	313.8	328.2	330.1	388.0	459.7	560.9	512.5	433.0
Traditional exports, volume index	100.0	101.5	77.6	97.2	99.2	99.8	95.1	92.1	99.9	105.1
Nontraditional exports value (m. U.S. $)	25.7	31.6	38.5	53.2	80.5	101.7	150.0	165.8	198.3	170.0
Nontraditional exports, volume index	100.0	101.9	115.2	138.9	157.6	212.5	196.9	226.1	266.9	290.8
Nontraditional export as % of total exp.	7.2	8.5	10.9	13.9	19.6	20.8	24.6	22.8	27.9	25.7

Sources: World Bank, Report No. 3768-BD, dated March 3, 1982; and Report No. 4277-BD, dated March 4, 1983.

[a] Value estimates in constant prices of 1973.
[b] BJMC only. Exports of jute yarn, twine, and carpets by private mills are included in the exports.
[c] Excluding lizard skins, but including leather goods.
[d] Traditional exports comprise raw jute, jute manufacturers, and tea.

TABLE 1.9
Jute Goods Exports, Bangladesh, 1973-82

Fiscal Year	Export Shipments					Value (mill. Taka)
	Hessian	Sacking	Carpet-backing	Others[a]	Total	
	(Volume--1000 long tons)					
1973	163.1	169.8	50.0	28.7	411.6	1447.9
1974	144.8	206.1	61.4	25.8	438.2	1586.5
1975	136.6	181.3	40.9	19.8	378.7	1858.6
1976	159.2	198.2	62.4	19.3	439.1	2778.4
1977	151.6	208.4	71.7	21.8	453.5	2782.3
1978	184.0	241.3	76.9	20.1	522.4	3733.2
1979	175.8	199.6	73.9	9.1	458.4	4199.0
1980	167.3	207.1	60.7	5.2	440.2	5950.0
1981	179.9	234.9	75.0	3.7	493.5	5767.7
1982	188.6	292.9	54.3	1.6	537.6	5681.4

Sources: World Bank, Report No. 3768-BD, March 3, 1982, p. 197; and Report No. 4277-BD, March 4, 1983, p. 133.

The agricultural sector performed reasonably well during the 1973-82 period with respect to the overall foreign trade picture. An estimated trade balance calculation for the agricultural sector confirms an earlier point that agriculture has significantly reduced its share of the deficit on current account (Table 1.10).[13] Between 1973-76, agriculture had a sector trade deficit as high as 43 percent of the total national trade deficit on current account. The sector balance was positive only in 1977, but since that year the agricultural sector deficit has been less than 11 percent of the total current account deficit for all years except 1980, and in 1979 it was only 4 percent. It is clear that agriculture is much less of a net drain on foreign exchange than conventional wisdom suggests and that the sector has improved its performance in this regard.

The overall trade situation is helped considerably by the private remittances that are returned to the country annually by Bangladeshis who have left the country to work under the Wage Earners Scheme, principally in Arab oil exporting countries. These payments have grown considerably and were estimated at $384 million in 1982 (Table 1.5, line 10). This is more than double the 1979 level. The government of Bangladesh has encouraged the

TABLE 1.10
Estimated Trade Balance Agricultural Sector, Bangladesh, 1973-82

Year	Traditional Ag. Exports[a]	Traditional Ag. Imports[b]	Balance	Ag. Sector Deficit as % of Total Trade Def.
	(millions of U.S. dollars)			
1973	329.6	404.2	-74.6	23
1974	342.3	474.3	-132.0	24
1975	313.8	749.0	-435.2	43
1976	328.2	557.9	-230.7	27
1977	330.1	272.7	+57.4	--
1978	388.0	443.6	-55.6	07
1979	459.7	495.1	-35.4	04
1980	560.9	922.6	-361.7	25
1981	512.5	610.4	-97.9	07
1982	430.5	585.4	-154.9	11

Sources: Calculated from TABLES 1.5, 1.6, and 1.8.

[a]Traditional exports include raw jute, jute goods, and tea.
[b]Traditional imports include food grains, edible oils, fertilizer, raw cotton, cotton yarn, and textiles.

export of labor through this program which is one form of export that utilizes the large labor supply of Bangladesh. The major drawback is that skilled people are being released, leaving a shortage of some skills on the domestic scene.

The current export base of Bangladesh is highly specialized and vulnerable. Moderate disruptions in supply or demand could worsen the nation's foreign trade situation. Furthermore, the extent of the export base is inadequate to support the quantity of imports needed to satisfy the country's increasing consumption and developmental requirements. With the current restricted and specialized export base, improvement will be difficult.

The limited export focus may have encouraged government planners to give undue importance to jute production and forego other options which, if exploited, might better assist in the development of Bangladesh. Obviously, jute will continue to occupy a central role in exports for the foreseeable future,

especially since there are no strong movements to otherwise expand the export base. Bangladesh has done little to extend its exports in the nonagricultural sectors, principally because the nation has failed to manage its primary resource base to this end. The major resource of Bangladesh is people. To date, the Wage Earners Scheme is one of the only initiatives which has been pursued to exploit Bangladesh's comparative advantage related to labor as a means of improving the nation's foreign exchange earnings. The abundant labor supply available in Bangladesh is an obvious area for more careful exploration in creating a much needed export base.

Most attention has been given to reducing imports as the vehicle for improving the trade balance. It seems reasonable, however, that imports will continue to rise both in support of and in response to economic growth and development. Some import substitution may be possible in foodgrains and fertilizer. but diversifying exports offers an equally important target for reducing trade deficits. The critical issue is one of an adequate "atmosphere" to encourage export development. If government regulations and policies exist which permit reasonable returns to ventured investment, one would expect response from both the public and private sectors. The absence of such a response is compelling evidence of a major constraint to expanding exports and ultimately to agricultural development. As will be detailed later, the BDG has not engaged in effective export promotion or restructuring of the regulations governing exports and imports. Furthermore, the heavy reliance on inefficient public corporations to provide most of the export initiatives has not proven successful and is not likely to do so until the private sector becomes more involved. A very recent effort of the BDG to encourage private sector participation in the economy and a related BDG decision to divest itself from control of large numbers of the public corporations has the potential to improve the atmosphere for export development.

Nutrition and the Diet

Quality of the Diet

While data are not adequate for a total assessment of the nutritional situation in Bangladesh, results of a 1975-76 study by the Institute of Nutrition and Food Science at Dhaka University provide a comparison with data from a similar 1962-64 study. These studies portray a worsening nutritional status for many segments of the population.

Total food intake per capita decreased 4.0 percent between 1962-64 and 1975-76 (Table 1.11). Bangladeshis consumed an average of 807.3 grams of food daily in 1975-76 as compared to

TABLE 1.11
Per Capita Daily Food Intake for Rural Bangladesh by Food Sources, 1962-64 and 1975-76

	1962-64		1975-76		
Sources	Grams/ Day	% Total Intake	Grams/ Day	% Total Intake	Percentage Change
Cereal	536.9	64	523.0	65	(-2.5)
Animal	57.4	7	44.0	5	(-23.3)
Other Plant & Vegetable	246.4	29	240.3	30	(-2.5)
Total	**840.7**	**100**	**807.3**	**100**	**(-4.0)**

Source: University of Dhaka, **Nutrition Survey of Rural Bangladesh: 1975-76**, December 1977 (Table 5.1, p. 33).

840.7 during the earlier period. Cereals accounted for 65 percent of the total intake in 1975-76, down by 2.5 percent. Consumption of animal protein declined 23.3 percent to only 44 grams per day.

Nutrition showed a similar decline between the two periods and demonstrates inadequacies in the quality of the diet.[14] Calorie intake declined 7.0 percent to 2094 per day (Table 1.12). Consumption of vitamins A and C were drastically reduced. Smaller reductions were recorded in the quantities eaten of fat, carbohydrates, and niacin. However, total protein consumption rose by 1.7 percent, and large increases were recorded in the consumption of iron and riboflavin, although Bangladesh diets are still deficient in the latter.

The consumption levels identified in the 1975-76 study showed deficiencies in several nutrient classes. The average daily caloric intake of 2094 was 93 percent of the calculated minimum daily requirement (MDR) for adults in Bangladesh (Table 1.13).[15] The inadequacy of caloric and other nutrients was much greater for some families (Table 1.14). For example, only 41 percent of the nation's families consumed the minimum daily caloric requirement of 2248 calories. Vitamin A intake was low averaging only 36 percent of the minimum requirement, and 89 percent of the families were deficient in this essential vitamin. The consumption of vitamin C was even more critical. Extensive riboflavin and calcium deficiencies also occur. Average

TABLE 1.12
Per Capita Daily Nutrient Intakes for Rural Bangladesh, 1962-64 and 1975-76

Nutrients	Daily Intake per Capita 1962-64	1975-76	% Change
Calorie	2251.0	2094.0	-7.0
Protein (gm)	57.5	58.5	+1.7
Fat (gm)	17.7	12.2	-31.1
Carbohydrate (gm)	476.0	439.0	-7.8
Calcium (gm)	304.0	305.0	-0.3
Iron (gm)	9.7	22.2	+128.9
Vitamin A (I.U.)	1590.0	730.0	-54.1
Thiamine (mg)	1.5	1.7	+13.3
Riboflavin (mg)	0.5	0.9	+80.0
Niacin (mg)	22.8	22.2	-2.6
Vitamin C (mg)	39.6	9.5	-76.0

Source: University of Dhaka, **Nutrition Survey of Rural Bangladesh: 1975-76**, December 1977 (Table 5.14, p. 49).

consumption of protein, thiamine, and niacin exceeded the minimum requirements. Still, upwards of 20 percent of the families were consuming inadequate amounts for minimum nutrition. Cereals provided the major source of all nutrients in Bangladesh. Their deficiency as sources of vitamins A and C partially explain the low consumption of these vitamins by Bangladeshis.

The inadequacy of food and nutrient intakes is corroborated by other findings of the 1975-76 study:[16] (1) the average caloric intake for all children up to fifteen years of age does not meet minimum requirements; (2) among children zero to five years of age, 16 percent suffer acute and chronic malnutrition; (3) only 22 percent of the Bangladeshi children ages zero to eleven years have normal weights and heights for their ages; (4) almost 800,000 people in Bangladesh suffer from night blindness due to vitamin A deficiency; and (5) 70 percent of the total population and 82 percent of children below five years of age suffer from anemia.

TABLE 1.13
Daily Nutrient Intake per Capita by Sources, Bangladesh, 1975-76

Nutrient	Source					
	Cereal	Other Plants & Vegetables	Animal	Total	MDR	Percentage of Minimum Daily Requirements
Calories	1795	252	47	2094	2248	93
Protein (gm)	44.1	9.4	5.0	58.5	45	129
Fat (gm)	3.4	6.6	2.2	12.2	--	--
Carbohydrate (gm)	397	40	2	439	--	--
Calcium (mg)	63	123	119	305	450	68
Iron (mg)	17.2	4.6	0.4	22.2	8	292
Vitamin A (I.U.)	26	643	61	730	2025	36
Carotene (mg)[a] (microgram)	47	1158	6	1211	--	--
Thiamine (mg)	1.37	0.26	0.02	1.65	0.9	183
Riboflavin (mg)	0.65	0.17	0.05	0.87	1.3	64
Niacin (mg)	19.91	1.85	0.44	22.20	14.8	150
Vitamin C (mg)	0	9.14	0.36	9.50	25.5	37

Source: **Nutrition Survey of Rural Bangladesh: 1975-76** (p. 50).

[a]Carotenes also are included in Vitamin A.

TABLE 1.14
Percentage Distribution of Households Meeting Minimum Daily Nutrition Requirements, Bangladesh, 1975-76

Percentage of Requirement	Percentage of Households Meeting Minimum Daily Requirement for:							
	Calories	Protein	Calcium	Thiamine	Riboflavin	Niacin	Vit. C	Vit. A
Less than 50	9	4	47	4	30	3	82	82
50-59	6	2	8	1	17	2	4	2
60-69	8	3	9	2	13	3	1	1
70-79	12	7	8	2	11	4	2	1
80-89	11	6	4	2	10	3	1	2
90-99	13	7	5	3	8	6	3	1
100 & above	41	71	19	86	11	79	7	11

Source: **Nutrition Survey of Rural Bangladesh, 1975-76**, compiled from Tables 5.13, 5.18, 5.20, 5.21, 5.22, 5.24, 5.25, and 5.26.

The Cost of the Diet

The declining nutritional situation is consistent with increases in the price of food which have characterized Bangladesh's economy since independence. The average annual compound rate of increase in the Food Price Index as measured for middle class people in Dhaka has been 12.5 percent during 1973-81 (Table 1.15). The upward trend has been steady except for a dramatic rise in 1975 caused by a severe drought. This suggests that the fundamental imbalances which are responsible for the upward pressure on food prices have remained fairly constant. The Food Price Index has tended to rise a little slower than the General Price Index. For the same period, the general index has risen at an annual compound rate of 14.0 percent.

A similar trend is found at the wholesale price level (Table 1.16). For agricultural products, the Dhaka Price Index has risen about 12.7 percent annually from 1973-81. The price surge in 1975 also is found in the wholesale index for both agricultural and industrial products. The same pattern exists for the composite wholesale price index for agricultural products for all of Bangladesh except that the level of the index tends to be slightly lower for the whole country than for Dhaka alone. This suggests wholesale prices are slightly lower in rural than in urban areas.

The extent and directness of the impact rising food prices have had on the nutritional quality of the average Bangladeshi diet can be partially assessed from the increases in individual retail food prices since 1973 (Table 1.17). For example, medium-boiled rice prices increased at an average annual rate of 9.0 percent during the period. By comparison, the price of onions increased by 14.8 percent, sugar by 16.2 percent, and masur by 15.9 percent.

In relative terms, food prices have tended to increase at a slower rate than nonfood items.[17] This can be seen by comparing the index of food prices with the index of all nonfood items for middle class people in Dhaka (Table 1.15). The price of food has increased annually at an average rate of about 3.2 percent less than for nonfood items. The relative price of rice, a major wage good, has increased much more slowly than the price of most other commodities. When the price of medium-boiled rice is deflated by the index of retail prices for nonfood items for middle class people in Dhaka, the relative price decline is 4.6 percent per year (utilizing least squares to calculate the annual rate). When the same price of rice is compared to the wholesale price of industrial products for Bangladesh, a similar downward trend is noted in the relative price, but the decline is only 3.3 percent.

A USAID estimate for coarse rice also argues that relative rice prices have been declining.[18] The price data for the USAID analysis came from a nationwide sample which reported the lowest

TABLE 1.15
Cost of Living Index for Middle Class People in Dhaka by Expenditure Groups, Bangladesh, 1973-81 (Base: 1969-70 = 100)

Fiscal Year	General	All Nonfood[a]	Food	Fuel and Lighting	Housing & Household Requisites	Clothing & Footwear	Miscellaneous
1973	181.5	177.8	184.7	191.8	132.1	231.8	178.5
1974	252.5	240.3	263.5	249.6	160.7	355.3	236.7
1975	407.6	339.3	469.6	358.7	268.2	413.4	344.6
1976	380.1	375.4	384.6	370.1	405.8	380.0	357.6
1977	382.5	400.4	366.7	391.0	476.4	387.0	364.8
1978	440.6	451.2	431.2	401.0	563.7	466.2	395.2
1979	485.7	507.4	466.2	436.7	655.7	513.5	440.1
1980	461.1	558.8	549.7	500.3	715.5	560.1	485.7
1981	628.3	655.6	603.6	657.5	879.6	653.6	531.4
Annual Compound Growth Rate (%)[b]	14.0	15.7	12.5	13.3	26.7	10.8	12.6

Sources: Bangladesh Bureau of Statistics, **1980 Statistical Yearbook of Bangladesh**, p. 440; and Bangladesh Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, December 1981, p. 125.

[a]Calculated by utilizing the weights for the four classes of nonfood items and setting them equal to 100.
[b]Calculated by least-squares trend line.

TABLE 1.16
Wholesale Price Indices of Agricultural and Industrial Products, Bangladesh, 1973-82 (1969/70 = 100)

	Weights, in % of Total	Fiscal Year									
		1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[a]
A. Dhaka Index											
Agricultural products	**67.87**	**170.94**	**232.92**	**379.89**	**326.27**	**375.14**	**403.96**	**463.89**	**499.12**	**535.83**	**608.87**
Food	41.08	178.53	264.53	460.54	341.29	333.42	385.98	332.36	548.14	561.27	660.76
Raw materials	25.94	157.32	178.76	248.54	298.23	439.40	434.62	499.38	422.23	494.72	526.98
Fuel	0.85	220.00	357.65	490.59	456.47	430.59	337.65	412.94	476.76	561.18	600.00
Industrial products	**32.13**	**204.82**	**256.36**	**447.43**	**400.03**	**407.69**	**440.60**	**442.58**	**566.91**	**594.09**	**654.06**
Food	7.96	199.37	241.33	466.46	434.42	415.83	432.29	469.60	517.63	567.08	644.97
Raw materials	6.38	178.84	207.99	518.18	360.19	413.64	520.22	439.18	581.24	503.29	539.50
Fuel and lighting	6.16	169.96	214.77	283.44	397.56	399.68	404.87	410.88	543.67	621.92	700.81
Manufacturers	11.63	241.27	315.22	482.45	399.66	403.10	422.10	442.73	602.32	647.64	698.37
All Products	100.00	181.83	240.45	401.59	349.97	385.60	415.80	456.98	520.58	554.55	623.39
B. Bangladesh Index											
Agricultural products	**67.87**	**168.12**	**228.41**	**370.30**	**339.96**	**347.75**	**396.58**	**444.94**	**481.41**	**508.93**	**578.34**
Food	41.08	176.37	243.72	421.08	342.73	323.36	376.90	429.67	527.78	545.40	636.71
Raw materials	25.94	154.59	203.62	289.36	332.88	384.58	427.49	458.50	406.67	449.42	483.73
Fuel	0.85	171.76	244.70	385.88	421.18	402.35	403.53	463.53	520.00	531.76	645.88
Industrial products	**32.13**	**200.53**	**294.24**	**458.54**	**400.68**	**391.53**	**431.59**	**449.36**	**543.95**	**603.02**	**651.70**
Food	7.96	213.44	262.58	531.28	421.11	412.69	440.73	480.40	516.59	562.94	608.29
Raw materials	6.38	176.49	368.03	515.67	408.93	397.18	511.13	414.42	515.67	529.78	511.44
Fuel and lighting	6.16	173.86	226.14	292.53	356.52	352.44	362.18	445.45	548.86	661.04	772.73
Manufacturers	11.63	219.96	311.52	466.47	405.50	394.84	418.40	449.36	575.75	644.63	694.24
All Products	100.00	178.53	249.56	398.78	359.47	361.82	407.82	446.36	501.51	540.99	601.92

Source: World Bank, Report No. 3768-BD, dated March 3, 1982.

Note: The wholesale price indices (base 1969/70 = 100) are prepared for six urban centers in Bangladesh (Dhaka, Chittagong, Khulna, Rajshahi, Sylhet, and Rangpur) and cover 44 individual items. Weights are assigned in proportion to the gross value of production for each item in the base year 1969/70. The national index represents the unweighted average of the indices for the six urban centers.

[a]Up to October 1982.

TABLE 1.17
Trend in Retail Prices of Selected Food Commodities, Bangladesh, 1973-81 (in Taka)

Commodity	Units	Fiscal Year 1973	1974	1975	1976	1977	1978	1979	1980	1981	Compound Growth Rate[a]
Rice, medium (boiled)	Maud	89.20	120.40	244.40	153.90	133.14	163.31	184.74	248.74	214.23	9.0
Chicken	Seer	6.57	8.15	10.07	12.10	13.19	15.20	18.52	19.36	21.83	15.9
Potato	Seer	1.22	2.01	2.62	2.73	1.97	2.38	3.48	2.77	3.40	9.6
Onion	Seer	0.93	2.30	2.57	2.72	1.58	5.07	2.40	4.88	4.23	14.8
Milk (fresh)	Seer	1.51	2.13	3.59	4.37	4.45	4.33	4.85	5.35	6.02	16.0
Sugar (white)	Seer	2.13	4.00	5.82	6.40	6.50	6.50	6.50	7.92	11.37	16.2
Banana	4 pcs.	1.09	1.44	1.86	2.01	1.84	2.12	2.39	3.04	3.36	12.9
Betelnut	Seer	13.30	21.23	30.59	21.93	20.23	26.11	34.52	34.65	36.42	10.4
Mustard oil	Seer	11.79	15.02	31.17	21.14	17.97	24.30	24.25	23.87	31.01	8.5
Chillies (dry)	Seer	3.78	10.31	46.66	11.96	16.41	29.07	16.90	11.99	30.50	13.6
Masur	Seer	2.41	4.09	4.79	5.97	4.52	6.23	7.13	8.29	10.49	15.9
Beef	Seer	5.73	8.01	10.85	11.42	11.38	13.30	17.56	18.45	20.84	15.8

Source: World Bank, Report No. 3768-BD, dated March 3, 1982, p. 271.

Note: All prices shown represent simple averages of weekly average prices during the year in seven urban areas.

[a]Estimated by least-squares trend line.

daily price occurring in the market. The price data analyzed above for medium boiled rice, which also suggests declining relative prices, are for a different class of rice and come from a sample of seven major markets which uses average daily prices in reporting consumer prices. The two data sets are not compatible for comparing actual prices, but the results of both estimates support the postulate that the trend in relative rice prices has been downward.

Aside from the changing structure of prices, movements in real income also impact on the nutrition of people in Bangladesh. Of concern is whether the real purchasing power of Bangladeshis has risen or fallen and how these changes compare in direction and magnitude with those of relative food prices. Unfortunately, data on real wages are even less reliable than those for food prices. There is general agreement that real income levels fell from the mid-1960s to the mid-1970s.[19] There is less agreement on what has happened since 1976. One estimate indicates a decline of 45 percent for real agricultural wages from 1968 to 1976 and even larger declines for other occupations.[20] Since 1975, the same source estimated real agriculture wages have fallen about 2.0 percent. Nonagricultural wages showed a moderate improvement. Overall, real wages are judged to have stagnated at somewhat near the 1975-76 level.

These price and wage trends since 1974 would support the prior conclusion regarding the current status of nutrition in Bangladesh, i.e. that the dietary situation reported in the 1976 nutrition survey likely has not improved and may have deteriorated somewhat since the 1960s. The worsening of real purchasing power for most consumers, as evidenced by falling or at best stagnating real wages, is one good indicator that, on average, consumers are not better off now than previously. Furthermore, with the limited growth in per capita production levels recorded in agriculture, it is likely that income distribution may have worsened somewhat and that the lower income groups have suffered disproportionately greater decreases in real income.[21] Not only have their real incomes probably been reduced by low agricultural expansion and limited nonagricultural employment opportunities, but rural people also lack the flexibility of options available to higher income groups to deal with the impact of inflation and economic instability on personal welfare. Such alternatives as hedging, stockpiling of consumption goods, or purchasing more stable foreign currencies to protect against the eroding value of the Taka are not within the means of the mass of Bangladesh's people.

Rural Markets for Nonagricultural Products

Expansion of national markets for nonagricultural products into rural areas is an essential part of the development process. Increased effective demand by rural residents for nonagricultural products is self-reinforcing to the overall process of economic growth. As food prices decline in real terms from gains in agricultural productivity, the increased incomes gained by rural people can be used to buy nonagricultural items which broadens and deepens the total development process.

The agricultural sector has not provided an expanding market for the products of the nonfarm sector in Bangladesh, as growth in effective demand has been very limited. The rural market potential for nonfarm products is considerable given the large percentage of the population living in rural areas. The extent of the market, however, is conditioned by two factors: the level of income, and how much disposable income is available for non-food purchases. A household expenditure survey in 1974 by the Bureau of Statistics provides the only data base for evaluating the situation.[22] The study was based on a sample of 9,535 urban and 2,237 rural residents in all geographical regions of Bangladesh.

The household study found an average household had 5.78 members with an expenditure of Tk. 490.55 per month (Table 1.18). This amounts to about $126 per household member per year, which is slightly higher but consistent with estimates of GDP per capita (in current prices) presented earlier. The study indicated that 99.8 percent of total family expenditures were on consumption items. The remainder went to taxes and related items with minimal amounts to savings.

Rural residents in Bangladesh spent 75 percent of their consumption income for food items, mostly to buy rice and rice flour. The remaining 25 percent--Tk. 124 per month per household--was available for nonfood purchases. Housing costs which included fuel, rent, and furniture represented 13.4 percent of total expenditures. Fuel costs alone (mostly fuel wood, dung cake and kerosene) accounted for about 8 percent. Clothing and footwear approximated 5 percent of total expenditures. The minimal amounts spent on miscellaneous items were mostly for personal and medical care.

The survey made no attempt to inventory the specific types of nonfood items purchased by rural Bangladeshis. But inferences drawn from the expenditure categories of the study suggest that rural residents purchased a variety of nonagricultural goods and services most of which were essential to everyday operation of the household. There were few frills. Also, the level of their expenditures for these items were extremely low. No recent data are available to assess in detail the current demand and expenditure structure. An extrapolation of the 1974 expenditure

TABLE 1.18
Rural Expenditures for Food and Nonfood Products, Bangladesh, 1973-74

Item	Average Monthly Expenditure per Family (taka)	Percentage of Total
Food and drinks	366.54	74.72
Clothing & footwear	25.80	5.26
Personal effects	0.98	0.20
Housing	65.88	13.43
(Rent)	(23.77)	(4.85)
(Fuel & light)	(39.64)	(8.08)
(Furniture)	(2.45)	(0.05)
Other	31.33	6.39
Total	**490.55**	**100.00**

Source: Bangladesh Bureau of Statistics, **Household Expenditure Survey of Bangladesh, 1973-74**, Dhaka, August 1978, p. 26.

situation to present day Bangladesh is probably quite accurate. Demand in rural areas for nonfood products likely continues to be highly limited. The magnitude of expenditures in nominal terms may have increased as general price and wage levels have risen. There is little reason to expect that the structure of expenditures has been altered significantly, especially that proportion of income available for nonfood purchases. Furthermore, there is no evidence of real income increases among rural Bangladeshis that would expand their demand for nonfood items. In fact, declining per capita GDP in agriculture suggests real rural incomes also may be declining. Until rural disposable incomes increase considerably, the demand for goods and services with higher income elasticities of demand will be limited and will prove incapable of providing a strong supportive base to overall development.

Employment Generation in the Agricultural Sector

Agriculture is clearly the most important employer of labor in the economy of Bangladesh. Details about the employment

structure for both the agricultural and other sectors are not clear. The official data base is judged as questionable by most donor organizations, and considerable effort has been made by these agencies to develop independent estimates, because of the extreme importance of employment issues to the development strategy of the nation.

A 1977 estimate by the FAO/UNDP Mission used 1976 as the base year and provides the most authoritative data currently available.[23] The total work force was placed at 27.1 million based on an assumed participation rate of 33.9 percent of the total population (Table 1.19). The estimated agricultural labor force was 21.1 million, or 78 percent of the total work force.

Agricultural employment, however, was 12.8 million of which 8.9 million were working in crop production and the remainder in other types of agriculture. Unemployment, measured in terms of person-days of work offered but not utilized, was estimated at 8.3 million in 1977, which was 39 percent of the agricultural labor force and 31 percent of the total labor force. The 1977 estimates of unemployment are considerably greater than the 1 to 2 percent officially acknowledged, and seem unusually high.[24]

The Bangladesh unemployment issue is further clouded by seasonal labor needs and a lack of understanding of the total use of labor within a subsistence economy. There is substantial evidence of a strong seasonal demand for farm labor in April-May, and November-December. The seasonal demand for this period is approximately twice the requirement at other times during the year. The extent to which labor is sufficiently mobile to meet these demands will influence measured unemployment levels. Furthermore, production processes in rural households draw on all combinations of family and hired labor to perform a wide range of household tasks. The utilization of the labor supply and the level of unemployment in Bangladesh might differ considerably from current conventional knowledge if these factors were considered in estimating rural employment.

Without equivalent estimates for years prior to 1976, it is not possible to compare the past and recent performance of the agricultural sector in meeting the employment needs of the economy. Obviously, agriculture will continue to occupy a critical role in providing new employment opportunities in Bangladesh. It cannot be otherwise with 78 percent of the nation's total employment in that sector.

Under the most optimistic set of agricultural growth assumptions from the FAO study (assumption No. 2, Table 1.19), the projected addition of 5.0 million members to the agricultural labor force by 1986 (26.1 million in total) will not be absorbed in the sector. Unemployment could reach 10.3 million and remain at about 39 percent of the agricultural labor force, but the number of unemployed would rise by 2.0 million. In this instance, agriculture will absorb 59 percent of the added agricultural labor force. Unemployment might reach as high as

TABLE 1.19
An Agricultural Work Force Projection for Bangladesh, 1976 and 1986

	1976	1986	Exponential Rate of Change
			%
Population (million)	80.00	106.20	2.8[a]
Participation rate %	33.90	33.90	--
Total labor force (million)	27.10	36.00	2.8
Nonag. labor force (million)	6.00	9.90	4.9
Ag. labor force (million)	21.10	26.10	2.1
Employed in:			
a. Crop	8.91	9.78	0.9
b. Livestock	1.13	10.72	1.9
c. Fisheries	0.61	0.87	3.6
d. Forests	0.11	0.13	1.7
e. Rural works	0.48	0.77	4.7
f. Other	1.60	2.04	2.4
Total Ag. Employment (million):			
(Assumption #1)	12.84	14.86	1.5
(Assumption #2)	12.84	15.80	2.1
Total Ag. Unemployment (million):			
(Assumption #1)	8.3	11.20	3.0
(Assumption #2)	8.3	10.30	2.2

Source: FAO/UNDP Mission to Bangladesh, "Agricultural Employment in Bangladesh," Working Paper XI, Dhaka, April 1977.

[a]The reader should note that the population growth rate used here is 2.8 percent and is higher than the 2.5 percent used by USAID and most other donors.

43 percent of the agricultural labor force under more conservative and realistic assumptions about sector growth (assumption No. 1, Table 1.19). This would lead to 11.2 million unemployed and agriculture will be able to employ only 40 percent of the new additions to the labor supply.[25]

The issue of unemployment levels in agriculture has not been totally addressed by any analysis to date. Another estimate by USAID argues that rural unemployment is about 29 percent, with between 2.5 million and 4.0 million employed in rural industries.[26] These figures portray a more optimistic picture

for rural employment, and add creditability to a proposed strategy of rural industrial development as a basis for increasing employment opportunities for rural people. The strategy could be especially effective if predicated on rising agricultural output, which will expand both purchasing power and on-farm employment for rural residents.

Other studies have looked at underemployment in Bangladesh based on in-depth data collections from small areas or villages. One such study in Barkait (Comilla district) estimated male underemployment at 24.2 percent and for females, 32.2 percent.[27] Another study in the village of Barisal (Khulna district) estimated that 27 percent of the total supply of man-days were unemployed.[28]

Regardless of which numbers are accepted as the most appropriate, two conditions are obvious regarding employment issues in Bangladesh. First, agriculture is and will continue to be the largest sectoral employer in the nation for many years to come. Secondly, even with the most favorable projections of agricultural growth and related impacts, agriculture cannot totally absorb the projected increase in the labor force, even under the most favorable assumptions. The issue of employment is one of the more important and most difficult associated with a developmental strategy for Bangladesh. At the base of the argument is whether a production oriented focus can sufficiently deal with the critical employment situation expected in the immediate future. The FAO report takes a very hard stand on this issue.

> Given the limited ability of the urban sector to absorb labor and the fact that the labor force of 20 years hence is already mostly with us, the general implications are obvious. There has to be a major focus on production increasing public works and labor using technology. Whatever the future institutional reforms of rural Bangladesh, there is no practical alternative.[29]

Whether or not this position finds expression in the development strategy of Bangladesh depends upon the tableau of alternatives that are available within the foreseeable constraints the BDG will encounter. But there can be little argument with the urgency of need and the critical nature of the employment issue. In the final analysis, all developmental strategies come down to welfare improvement, and no strategy can be declared adequate that does not have this as its clear objective.

Income Distribution and Labor Productivity

Relative changes in per capita income between rural and urban regions offer one indication of the efficiency of the labor markets in allocating labor to higher paying jobs (assuming most of income is from wages). If the markets are functioning efficiently, one would tend to see real per capita incomes converge toward a ratio of unity as labor moves from the lower to the higher remuneration areas, creating concomittant changes in wages. The mobility of labor is conditioned in large part by three factors: (1) the skill requirements of the higher paying employment; (2) other market entry restrictions which may be caused by unions or other monopsony elements; and (3) the absorptive capacity within the new employment sectors which would limit the number of jobs available at the prevailing wage rate.

Care should be exercised in interpreting per capita income changes between urban and rural areas. Problems of measurement are difficult and can influence the comparability of the data. Per capita income estimates are derived from GDP accounts by classifying activities according to their location. Urban and rural incomes, therefore, may not conform strictly to the standardized definitions since people living in rural areas may earn some income in urban areas and vice versa. Of considerable significance is the fact that the estimates used here are averages and consider income from all sources, not just labor.[30]

Since 1973, trends in both rural and urban real GDP per capita have been upward (Table 1.20). Rural incomes have increased at an average annual rate of 1.6 percent, which is reasonably consistent with the growth in agricultural GDP per capita reported in Table 1.3. Urban incomes have grown at an annual rate of 7.6 percent. In 1973, the gap between urban and rural dwellers was of a magnitude of 2.73 times. By 1979, it had widened to 3.85. The World Bank study cited earlier in discussing the cost of the diet also reported agricultural wages declining in relation to wages in nonagricultural employment.[31]

The divergence of wages over time suggest that labor may not be moving freely from the rural sector to employment in the nonagricultural sector and, in fact, may be dammed up in agriculture in very low-productivity jobs, employed on a part-time basis, or unemployed. Several interrelated factors are involved in the divergent trends in GDP per capita and wages.

The opportunities to move are likely restricted by the extremely limited capacity of the nonfarm sector to absorb labor. The nonagricultural sectors have not expanded sufficiently to provide needed employment options, despite impressive growth rates by some. Either the growth rates for these sectors emanate from a small initial base or the expansion of the sectors has not involved labor intensive technologies. Also, the education and skill levels of rural residents preclude their participation in a

TABLE 1.20
Comparison of Rural and Urban Gross Domestic Product per Capita, Bangladesh, 1974-80 (1973 taka)

Fiscal Year	Rural	Urban	National	Ratio Urban/Ratio
1974	568	1585	662	2.79
1975	563	1725	670	3.06
1976	611	1946	734	3.18
1977	594	2047	727	3.45
1978	628	2106	764	3.35
1979	627	2282	780	3.64
1980	632	2431	798	3.85

Source: Bangladesh Bureau of Statistics, **Socio-Economic Indicators of Bangladesh**, September 1981, p. 113.

wide range of nonagricultural jobs. Rural people have such limited skills that even service sector employment in urban areas, which is usually characterized by relatively low skill requirements, may be beyond the range of many rural residents. Finally, the willingness of people to migrate may be limited by tradition, culture, or family. When one links the low skill levels of rural Bangladesh with their large numbers and limited job opportunities, depressed rural labor markets and wages are an inevitable consequence.

The composite effect of low demand for nonfood items, lack of purchasing power within a large segment of the population, and limited export potentials mitigate against extensive employment generation in the nonagricultural sector and an orderly flow of human resources between the two sectors. Present employment opportunities are not sufficient to absorb such large supplies of labor at anything approaching a subsistence wage.

A significant aspect of this problem is the potential for unemployed laborers to migrate to urban centers in search of employment. This could mean high social costs with urban slum conditions and related social unrest. If disparate urban income levels persist, significant rural-urban migration could result. Problems will certainly arise if rural-urban migration significantly exceeds employment opportunities. (The estimated magnitude of rural-urban migration in Bangladesh is presented in Chapter 2.) Such migration is occurring and at a rate that

should be sufficient to at least attract the attention of policy makers in the BDG.

Summary

The agricultural sector has made modest contributions to the economic development of Bangladesh since 1973. Sector growth rates have been encouraging but have lagged moderately behind those of the general economy which themselves have not been sufficient. Agricultural production more than kept pace with population in the early 1970s but has fallen slightly behind in the last five years despite record crop production in some recent years. Rapidly growing population and modest increases in per capita GDP have caused price pressures as demand for agricultural products has exceeded domestic production throughout the decade with a large differential since 1977. The demand/production gap and general inflationary pressures have resulted in rising food prices. Low agricultural productivity and an absence of growth in real purchasing power have not been conducive to economic growth.

The situation is aggravated by the perennial negative balance of payments which has been covered by foreign donor assistance, particularly of donated foodgrains and other commodities. Agriculture generates practically all of the nation's foreign exchange earnings. The export base is, however, too narrow and restricted to support the import needs of a full-scale development effort. Commercial imports of foodgrains and production inputs are a declining share of the nation's imports, as importation of capital goods, intermediate goods, consumer durables, and petroleum and its derivatives have skyrocketed. Commercial imports are not the critical item in the import/export imbalance of the country, and total imports are not excessive in comparison with other developing nations.

The modest performance of the agricultural sector likely has resulted in declining nutritional levels among Bangladeshis. Both food intake and nutrient consumption are below assumed average daily requirements for most critical items within a considerable portion of the society, although current data are lacking. The debilitating effects of malnutrition are extensive.

Agriculture continues to employ the largest segment of the population but is incapable of absorbing projected increases in the labor force. Unemployment is a more serious problem than portrayed officially, and its absolute magnitude will worsen as the labor force grows. The low per capita incomes in rural Bangladesh provide very little money for consumption of nonfood items, and, therefore, agriculture has not contributed significantly to the market for these products which is important to the total developmental process.

The divergence in rural and urban per capita GDP and wages is indicative of inadequate skill levels of rural residents and a lack of absorptive capacity for nonfarm employment. Rural-urban migration is occurring, likely in response to relatively higher urban incomes. If such migrants are unable to obtain higher income employment, it could result in a significant social cost.

Footnotes

[1]For an especially cogent analysis of problems facing Bangladesh immediately after its Independence see Muhiuddin Khan Alamgir, Development Strategy for Bangladesh (Dhaka University, June, 1980).

[2]Ibid., p. 59.

[3]All data are reported throughout this assessment in fiscal years. For example, 1973 is July 1, 1972 to June 30, 1973.

[4]World Bank, Bangladesh: Current Economic Situation and Review of the Second Plan, Vol. 1 (February 23, 1981): p. 1.

[5]The 1981 average exchange rate was Tk. 16.34 per dollar.

[6]Alamgir, Development Strategy.

[7]There is no totally acceptable estimate of population growth. The one used here is that of USAID. The 1981 Census recorded a growth of 2.36 percent since 1974, but most observers are not comfortable with the 1974 population count. The crude birth and death rates reported in Chapter 2 imply a 3.0 percent growth in population and the UNDP/FAO study of employment reported in Table 1.19 utilizes a rate of 2.8 percent. Likewise, there are no reliable estimates of income elasticity of demand. The one used here is within the range of those estimated in 1973 and is proposed only as indicative for discussion purposes. See: Muhiuddin Khan Alamgir and Lodewijk J.J.B. Berlage, "Evaluation of Income Elasticity of Demand for Foodgrain in Bangladesh from Cross-Sectional Data: A Skeptical View," The Bangladesh Economic Review (October 1973): 387-408.

[8]Real GDP per capita grew 1.8 percent between 1978-81 which, assuming an income elasticity of demand for food of 0.5, results in a growth in demand from income of .9 percent. This added to population growth of 2.5 percent is a growth in demand of 3.4 percent for 1978-81. This exceeds growth in agricultural production of 1.5 percent by 1.9 percent. Thus, while growth in demand has declined in recent years due to declines in per capita GDP (income), the rate of growth in agricultural production declined even more.

[9]See Chapter 3 for a more detailed discussion of agricultural production.

[10]Current dollars.

[11]United Nations, World Statistics in Brief, fifth ed., (New York, 1981).

[12]Traditional agricultural imports are defined as foodgrains, edible oil, fertilizer, raw cotton, cotton yarn, and textiles.

[13]The sector trade balance is based on traditional agricultural exports and traditional imports as defined in Table 1.10. No basis exists to estimate the agriculturally related imports and exports contained in the nontraditional accounts.

[14]The declines in food intake and nutrition status between 1962-64 and 1975-76, as demonstrated by the nutrition survey cited above, appear to be somewhat inconsistent with the annual average increase in per capita agricultural production between 1973-77 of 2.1 percent (Table 1.3). However, food availability in the early 1970s was reduced substantially because of the war and the typhoon. Increased food production per capita from 1973-77 could have raised nutritional status from very low levels in the aftermath of the war to the levels observed in the nutrition survey.

[15]There is a feeling that the MDR commonly used for Bangladesh are overstated since the average size of Bangladeshis is smaller than that assumed by the FAO in establishing their norms. Seckler's work in India addresses this point. See: David Seckler, "The Economics of Nutrition in Subsistence Agriculture: The Case of India" (Mimeo report; The Ford Foundation), February 1979. An unpublished estimate by Martin Hanratty of The Ford Foundation, Dhaka, places the distortion for Bangladesh at about 19 percent, which, if accepted, would reduce the caloric MDR to 1,827 instead of 2,248. The requirement may be slightly understated since it does not include added caloric needs for disease nor does it account for caloric losses in cooking. The latter are thought to be extensive, especially in the preparation of rice. Hanratty's estimate is in possession of the Food & Agricultural Division, USAID, Dhaka.

[16]Nutrition Survey of Rural Bangladesh, pp. 196-202.

[17]The index for food was divided by the index for all nonfood items to obtain the relative price of food from 1973-81, often referred to as the "real" price of food. We prefer to describe the deflated prices for food as a relative rather than a "real" price to avoid the interpretation that consumers actually paid a different price than the nominal price. A trend line was

fitted to the deflated prices to obtain the rate of change in relative food prices.

[18]Richmond Allen, "Agricultural Pricing," unpublished USAID Memo (August 24, 1981).

[19]For one analysis see: Rizwanul Islam, "Trends in Rural Income Distribution in Bangladesh," reprinted in Developmental Issues in an Agrarian Economy: Bangladesh (Center for Administrative Studies, Dhaka University, 1981), p. 9.

[20]World Bank, "Trends in Real Wages," Bangladesh: Current Economic Situation and Review of the Second Plan (Report No. 3309-BD dated September 29, 1981): 69-82.

[21]This conclusion is supported by Islam in his study of income inequalities in Bangladesh. See Islam, "Trends in Rural Incomes," p. 14.

[22]Bangladesh Bureau of Statistics. A Report on the Household Expenditure Survey of Bangladesh, 1973-74, Volume 1 (August, 1978).

[23]FAO/UNDP Mission to Bangladesh, Agricultural Employment in Bangladesh, Working Paper XI, Dhaka (April, 1977).

[24]For example see: A. R. Khan, Employment in Bangladesh During the Second Five-Year Plan (International Labour Office, October, 1979).

[25]For another more recent analysis of the potentials for the agricultural sector to absorb the rising labor force, see: World Bank, Bangladesh: Selected Issues in Rural Employment (Report No. 4292-BD, March 11, 1983). In this report, the Bank estimates that only 22 percent of the man days of labor added to agriculture between 1978-88 will be absorbed within the sector (p. 33).

[26]Richmond Allen, "Rural Industries Employment," Internal USAID Memorandum (November, 1979).

[27]Barkat-E Khuda, "Measurement of Under-Employment in Rural Bangladesh -- An Alternative Method," In Development Issues in an Agrarian Economy-Bangladesh (Center for Admin. Studies, University of Dhaka, 1981).

[28]Rushidan Islam, "Approaches to the Problem of Rural Unemployment in Bangladesh," paper presented to the Third Annual Conference of the Bangladesh Economic Association, Rajshahi (1977).

[29]FAO/UNDP, Agricultural Employment, p. 36.

[30]To the extent that wages are only a small share of income, the inferences about the performance of the labor market may be incorrect.

[31]World Bank, Trends in Real Wages, pp. 69-82.

CHAPTER 2
AGRICULTURE'S RESOURCE ENDOWMENT - IT'S LAND, PEOPLE AND INSTITUTIONS

> . . . Differences in technical inputs and human capital do account for a very substantial share of the agricultural productivity gap among countries; and even within the resource endowments category, internal capital accumulation appears to be relatively important as compared to the original endowments of land."
>
> Yujiro Hayami and
> Vernon W. Ruttan
> Tokyo University and the
> University of Minnesota

The nature and extent of the natural resource base is of obvious consequence to the performance of agriculture and to development generally. It constitutes a fundamental and integral part of the production system in agriculture. Yet, the concept of resources goes beyond the natural base. The endowment of human capability, the availabilty of new technical knowledge, the use of modern industrial inputs, and the system of public and private institutions serving agriculture, are also resources of considerable relevance to the process of growth and development in agriculture. Each of these elements is necessary for agricultural development, but each by itself does not insure development. History provides several examples of nations with excellent natural resource endowments which have stagnated or failed in their efforts to develop their agricultural sectors. Other nations, not so blessed with natural resources, have succeeded.

In this chapter, the resource base of Bangladesh is assessed. Included are the land, water, climate, and people of the nation. The land tenure structure, land use, and agricultural production patterns are also discussed. The institutional structure of Bangladesh is not addressed. The broader institutional arrangements are presented at various points throughout the study, and Chapter 6 is devoted entirely to public sector institutions and programs and their impact on agricultural development.

Resource Endowment

The climate and natural resource endowment are capable of producing a wide variety of products year-round, but the agricultural sector of Bangladesh is basically a rice economy. Geographically, the nation is a flat, alluvial plain with a fairly homogeneous type of land resource. Elevations seldom exceed 35 feet above sea level, with major exceptions being the Chittagong Hill Tracts region in the Southeast and the low hills of the Sylhet District in the Northeast. The nation is essentially a delta of deposited soils that are, for the most part, fertile but deficient in nitrogen. The soil shows a conspicuous absence of gravel and stones, which makes most kinds of construction difficult and requires improvised methods to create this type of resource.[1] The land area of Bangladesh is about 55,598 square miles which is roughly the size of the state of Wisconsin. A most impressive characteristic of the landscape is the profusion of rivers which traverse most regions of the country.

Rainfall and Temperature

Bangladesh has a humid, warm climate that is tropical in some regions but lacks the range of variability characteristic of nations with a more diverse terrain. Three seasons are generally recognized: (1) a hot summer season of high humidity from March to June, (2) a hot and humid monsoon season from June through October, and (3) a cool and drier winter season from November to early March. Maximum temperatures range between the low 40s to the high 20s (centigrade), and minimum temperatures reach just slightly above 0 degree centigrade (Table 2.1). The geographical differences are not great, but the higher temperatures tend to occur in the West and North. Frost is practically nonexistent in the country and is not a risk factor in agricultural production.

Rainfall, which ranges from 55 to 140 inches on average annually, is highly critical to agricultural production (Table 2.2). Foodgrains in particular depend on the timely arrival of rains. The tenuous balance between rainfall and cereal production is a central concern to policy makers and government officials. A delay of seven to ten days in the arrival of monsoon rains can have a dramatic impact on the total grain harvest. Floods and drought are common consequences of the extreme weather patterns. Other catastrophies can arise from the violence which sometimes occurs with cyclones and other weather extremes. For example, a cyclone in 1970 caused extensive damage and reportedly killed 300,000 to 600,000 people.[2] The level of rainfall tends to decrease from east to west. Sylhet and the Chittagong region to the East have the highest rainfall while the lowest is found in the Western districts of Rajshahi and Kushtia.

TABLE 2.1
Temperature Extremes by Month, Bangladesh

Weather Station	Item	Temperature (C)											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Barisal	Mx	32.2	33.9	37.8	41.1	38.3	37.2	36.1	36.1	35.0	35.0	33.3	31.7
	Mn	6.1	5.6	12.8	15.0	18.3	21.1	21.1	21.1	21.7	17.8	10.6	7.2
Bogra	Mx	31.1	35.0	41.7	43.3	43.9	39.4	36.7	37.2	36.1	35.0	32.8	31.1
	Mn	4.4	3.9	8.3	13.3	16.7	19.4	18.9	21.7	21.1	16.1	10.6	6.7
Chittagong	Mx	30.6	32.8	35.6	37.8	39.4	35.0	35.0	35.6	35.0	35.0	33.3	31.7
	Mn	8.9	10.6	12.2	14.4	20.0	21.1	21.7	22.2	21.1	18.3	13.3	10.6
Cox Bazar	Mx	32.8	33.9	37.2	37.2	36.7	40.6	35.0	33.9	33.9	35.0	33.9	31.7
	Mn	7.8	9.4	11.1	16.7	16.7	20.6	21.7	19.4	21.7	17.2	13.3	8.9
Rangamati	Mx	31.7	35.0	37.8	38.9	42.2	37.8	35.6	36.7	35.6	35.6	33.3	31.7
	Mn	6.7	7.2	11.1	17.2	19.4	20.6	22.8	22.2	22.2	18.3	12.8	9.4
Comilla	Mx	31.1	35.0	38.3	41.7	41.7	37.2	36.7	37.8	36.1	36.1	35.9	31.7
	Mn	5.6	6.1	8.9	14.4	17.8	15.6	19.4	15.6	20.6	16.7	11.1	7.2
Dhaka	Mx	30.6	35.0	39.4	42.2	42.2	37.2	35.0	36.1	35.0	33.9	32.2	30.6
	Mn	5.6	7.2	12.8	15.6	18.9	21.1	22.8	23.3	21.7	17.2	11.7	6.7
Dinajpur	Mx	29.4	34.4	40.6	43.9	43.3	41.7	38.3	37.8	41.1	36.1	33.9	30.0
	Mn	2.8	1.1	6.1	11.1	16.1	18.9	21.7	20.6	21.7	15.6	8.3	4.4
Faridpur	Mx	30.0	35.0	39.4	41.7	41.7	36.7	35.6	35.0	37.2	35.6	33.9	29.4
	Mn	3.9	4.4	7.8	12.2	15.6	17.8	21.1	22.8	21.1	18.3	11.1	6.7
Jessore	Mx	32.2	36.7	41.1	42.8	42.2	40.6	35.6	36.1	36.7	37.2	35.0	30.6
	Mn	2.2	3.3	8.3	13.9	17.8	21.1	21.1	22.2	22.2	14.4	6.7	4.4
Khulna	Mx	32.2	36.1	39.4	40.6	41.7	39.4	37.2	36.1	37.2	36.1	34.4	31.7
	Mn	7.2	7.2	10.0	17.8	18.3	21.7	21.7	22.2	22.8	17.8	11.7	7.2
Mymensingh	Mx	29.4	33.3	38.9	42.2	41.7	37.2	36.1	36.7	36.7	36.7	33.3	30.6
	Mn	4.4	4.4	8.3	15.0	16.7	20.0	22.2	22.2	21.1	16.1	11.1	7.2
Maijdi Court	Mx	31.7	33.9	40.6	40.0	40.6	36.1	36.7	35.0	36.1	35.0	33.3	30.2
	Mn	4.4	5.0	7.2	13.9	17.2	20.0	20.6	21.1	21.1	15.6	10.6	6.7
Noakhali	Mx	28.6	31.0	34.3	35.5	34.6	33.4	32.0	32.8	33.4	33.2	31.1	28.8
	Mn	10.9	12.0	15.8	19.4	20.4	22.5	23.6	23.5	23.5	21.2	15.8	12.3
Pabna	Mx	28.3	33.0	38.1	40.6	40.0	36.6	34.2	34.2	34.9	34.7	32.1	29.2
	Mn	7.9	9.4	12.9	17.7	20.3	22.3	23.8	24.3	23.7	18.9	13.1	9.3
Sirajganj	Mx	30.6	35.0	40.6	42.8	42.8	37.9	40.0	39.4	38.3	37.2	33.9	31.7
	Mn	5.0	7.2	11.1	13.3	17.8	20.6	21.7	23.3	21.7	17.2	10.6	7.2
Rangpur	Mx	28.9	33.3	38.9	40.6	42.8	39.4	37.8	36.7	36.1	35.0	33.9	28.3
	Mn	3.9	6.1	10.0	13.3	18.3	20.6	22.2	22.8	21.7	15.0	10.0	4.4
Srimangal	Mx	26.7	34.4	39.4	41.1	41.7	37.2	37.2	37.2	37.2	36.1	35.6	32.2
	Mn	1.7	2.8	5.0	10.6	16.7	20.0	21.7	21.1	19.4	12.2	7.8	2.8
Sylhet	Mx	28.3	32.8	36.7	38.9	40.6	35.6	36.1	37.8	36.1	35.0	32.2	30.6
	Mn	5.6	6.7	12.2	13.9	18.3	20.6	21.1	21.1	21.7	16.7	12.2	8.9

Source: International Rice Research Institute, **Agro-Climatic Survey of Bangladesh**, Manila, undated, pp. 253-254.

The heaviest rains occur during the monsoon months from late May to early October. The months from December to March are the driest.

In general, the rainfall and temperatures of Bangladesh provide excellent conditions for agricultural production. The year-round season offers considerable potential for multiple crops if cropping patterns and resource availability can be properly coordinated. Cropping cycles are closely attuned to the

TABLE 2.2
Monthly Rainfall by District, Bangladesh[a] (in inches)

Districts	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual Total
Dhaka	0.6	1.0	2.1	5.3	8.6	13.1	15.6	13.2	9.4	6.2	1.2	0.1	76.3
Mymensingh	0.5	0.7	1.7	5.4	2.3	17.8	14.6	16.0	13.4	7.8	0.7	0.1	91.1
Faridpur	0.5	1.0	1.4	5.0	10.7	13.6	13.3	12.3	9.6	7.1	1.2	0.1	75.8
Chittagong	1.6	4.9	4.1	3.9	11.4	25.3	31.0	26.6	15.5	9.8	2.4	1.0	137.3
Chittagong H.T.	0.6	2.4	3.1	0.2	0.5	26.5	26.8	15.7	11.1	10.5	0.8	0.9	89.1
Noakhali	0.6	0.8	1.8	3.9	11.8	21.7	21.4	21.8	16.5	8.2	1.9	0.2	110.4
Comilla	0.4	1.4	2.4	5.9	11.8	16.7	14.0	14.0	11.2	7.9	7.5	0.1	93.3
Sylhet	0.7	1.5	3.0	8.3	22.3	28.2	18.3	15.7	18.4	9.2	1.0	0.2	126.7
Rajshahi	0.5	0.7	1.0	1.3	5.4	10.5	11.7	10.0	8.1	4.8	0.7	0.1	54.9
Dinajpur	0.4	0.5	0.6	1.9	7.4	13.6	15.4	13.9	11.8	5.4	0.5	0.0	71.4
Rangpur	0.5	0.6	0.9	3.3	11.9	20.4	17.0	13.7	12.0	6.5	0.4	0.1	87.4
Bogra	0.5	0.7	1.1	2.5	7.7	13.0	12.2	13.8	10.8	9.1	0.5	0.0	72.2
Pabna	0.6	0.7	1.4	2.8	8.2	12.3	11.4	12.0	9.3	6.3	0.8	0.0	65.8
Khulna	0.5	0.7	1.4	3.1	7.3	11.9	14.5	12.1	9.0	5.9	1.3	0.1	67.7
Barisal	0.6	0.7	1.5	3.9	9.2	16.6	18.5	17.0	12.3	7.7	1.6	0.1	89.8
Jessore	0.5	0.9	1.4	3.5	7.4	10.8	12.4	12.0	7.4	5.4	0.9	0.1	62.6
Kushtia[b]	0.4	0.7	0.3	6.4	6.4	6.4	9.8	9.8	9.8	5.5	0.3	0.0	55.9
Bangladesh	0.6	1.2	1.7	3.9	9.4	15.8	16.4	14.7	11.5	7.2	1.4	0.2	84.0

Source: Ministry of Agriculture, **Bangladesh Agriculture in Statistics**, November 1973, pp. 148-149.

[a]Average for 73 years from 1878 to 1953 and 1957 to 1966 (excluding 1941-43).
[b]Ten-year average from 1957-66.

rainfall and climatic patterns (Figure 1). Among the major crops, aman rice production (particularly broadcast aman), jute, and, to some extent, the aus rice crops have production cycles to take advantage of the monsoon rains. Boro rice on the other hand, has been developed to follow the heavy rains and requires winter irrigation for optimal production. Wheat, potatoes, and most of the oilseed, spice, and vegetable crops, which are also grown during the winter months, can benefit from irrigation. But irrigation is not widely applied to these crops.

Ecological Zones

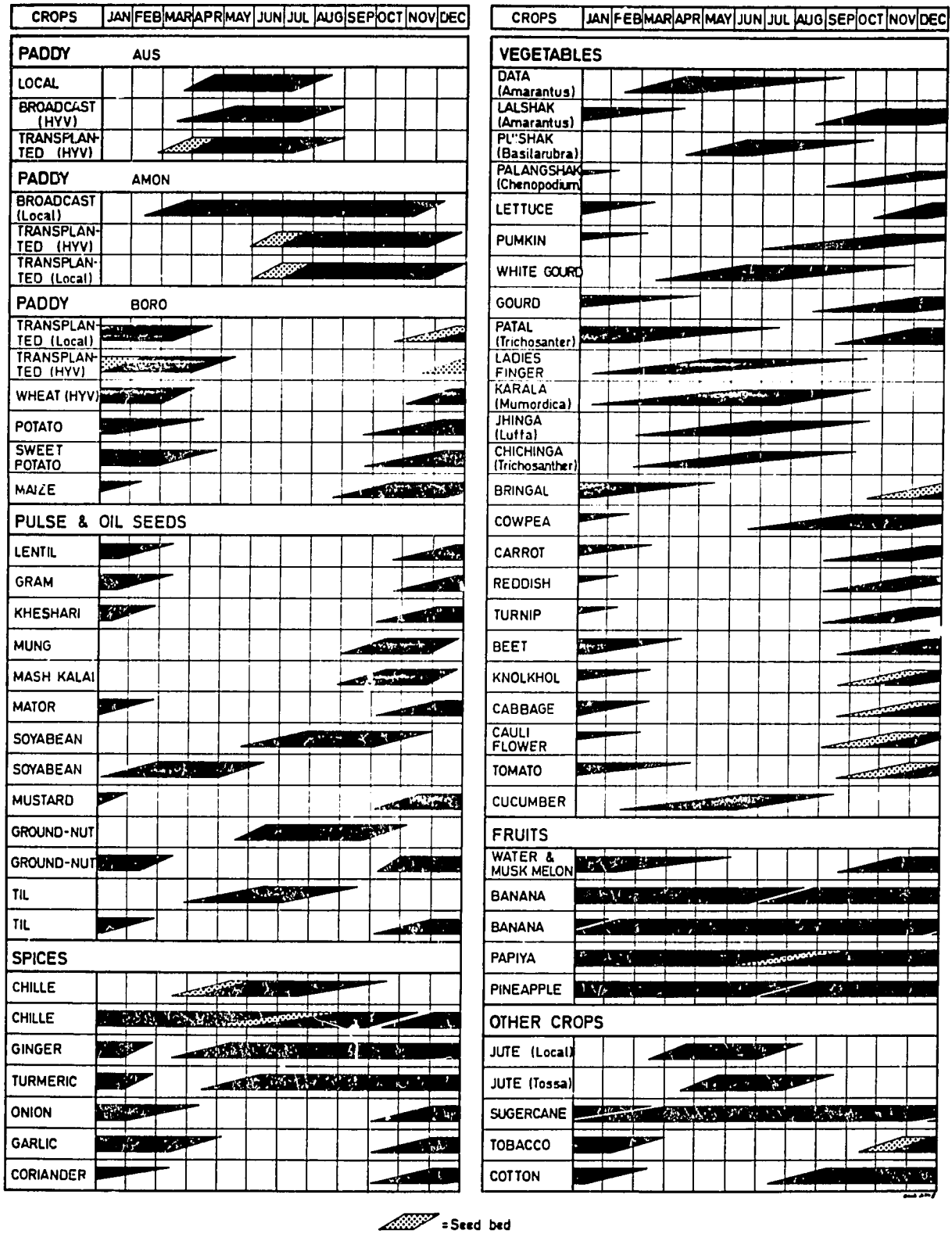
Bangladesh is organized into four political divisions, with some ecological variation among them. But the differences are not dramatic and certainly not of the magnitude found in other nations with a more varied geographical structure. Chittagong, Dhaka, Khulna, and Rajshahi, the four divisions, are all named for their capital cities (Figure 2). Variations in geography and, to some extent, rainfall patterns tend to influence the ecology and subsequently the agricultural production patterns of the divisions. The Chittagong division with its higher rainfall, especially in Sylhet and the Hill Tracts, contains the major portion of the forest regions of Bangladesh. Khulna division, has a major delta tidal forest and the world's largest mangrove forest; Dhaka and Khulna divisions tend to be the wet plain regions of the country. Rajshahi is the dryland region, assuming that 55 inches of rainfall annually can be considered dry.

Water Resources

One of Bangladesh's principal resource endowments is its water which forms the basis for its transportation system and holds the key to agricultural development. Four major rivers and their numerous tributaries flow through Bangladesh: the Ganges-Padma; the Brahmaputra-Jamuna; the Meghna; and the Teesta. All converge and empty into the Bay of Bengal. The volume of water is huge. The rivers are estimated to discharge 5.0 million cubic feet per second at peak periods, which is double the flow of the Mississippi River (Table 2.3). The contrast between high and low runoff periods is dramatic. During the lowest months, the total runoff is only about 200,000 cubic fe t per second. The overall force and movement of the water are significant. The sediment carried downstream by the river system has been estimated at 2.4 billion tons annually.[3] Significant amounts of land are eroded by the water movement, especially along unprotected river banks. Many of the lowland areas are inundated during the high water season which limits the production cycle for these regions to one crop annually. The flooding deposits new soils, and the ponds of water left by the flooding can facilitate chemical reactions to

Figure 1. CROP CALENDAR OF BANGLADESH

EXISTING CROPPING PATTERNS



= Seed bed

(HYV) = High yield variety

EXISTING CROPPING PATTERNS:

1. AUS / JUTE + T. AMON
2. AUS + T. AMON + KHESARI (LATHYRUS)
3. JUTE + KALAI (PULSE)
4. AUS AND T. AMON MIXED
5. AUS + MUSTARD / PULSES / RABI VEGETABLES / TOBACCO / COTTON / POTATO
6. AUS AND ARHAR (CAJANUS) / TIL (SESAMUM) MIXED
7. B. AMON
8. AUS AND B. AMON MIXED
9. BORO
10. SUGARCANE
11. SUMMER VEGETABLES + MUSTARD / PULSES

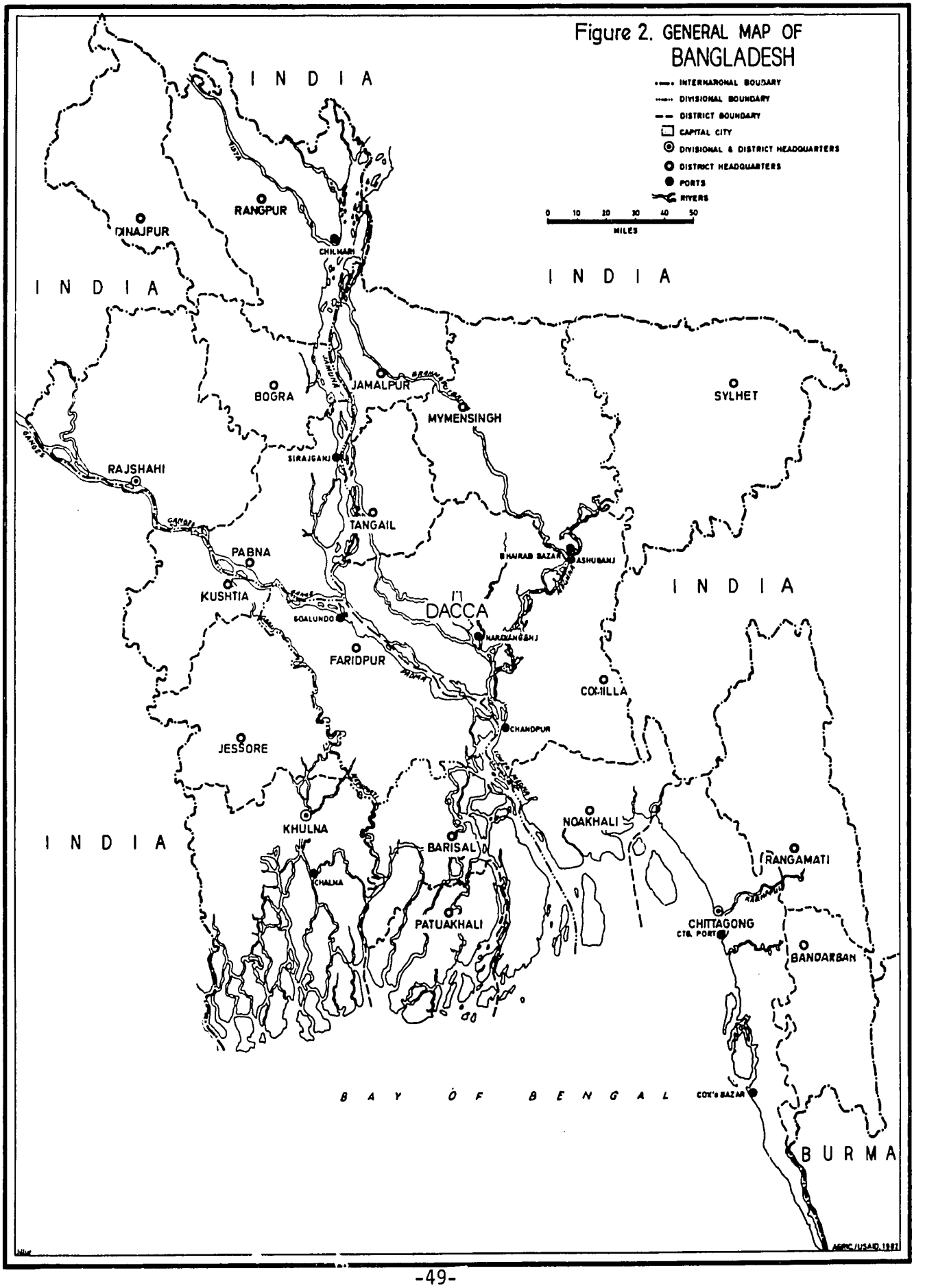


Figure 2. GENERAL MAP OF BANGLADESH
INTERNATIONAL BOUNDARY
DIVISIONAL BOUNDARY
DISTRICT BOUNDARY
CAPITAL CITY
DIVISIONAL & DISTRICT HEADQUARTERS
DISTRICT HEADQUARTERS
PORTS
RIVERS
0 10 20 30 40 50
MILES
INDIA
INDIA
INDIA
INDIA
INDIA
BURMA
BAY OF BENGAL
RANGPUR
DINAJPUR
CHILHARI
BOGRA
JAMALPUR
MYMENSINGH
SYLHET
SIRAJGANJ
RAJSHAHI
TANGAIL
PABNA
KUSHTIA
BHAIRAB BAZAR
ASHUGANJ
DACCA
GOALUNDO
NARAYANGANJ
FARIDPUR
COMILLA
CHANDPUR
JESSORE
KHULNA
NOAKHALI
BARISAL
RANGAMATI
CHALNA
PATUAKHALI
CHITTAGONG
CTG. PORT
BANDARBAN
COX'S BAZAR
AGRIC/USAID 1987

TABLE 2.3
Water Discharge by Major Rivers at Selected Points in Bangladesh, 1977-78 (thousand cusecs)

River	Point	1977-78 Highest	1977-78 Lowest
Ganges	Hardinge Bridge	1804.58	31.39
Jamuna	Bahadurabad	2351.59	159.97
Meghna	Bhairab Bazar	428.50	--
Teesta	Kaonia	215.77	4.87
Surma	Sylhet	64.57	0.119
Matamuhari	Lama	24.58	0.135
Muhuri	Parsuram	15.29	0.010
Gumti	Comilla	15.50	0.39

Source: Bangladesh Water Development Board, **1980 Statistical Yearbook of Bangladesh**, p. 115.

Note: Data related to April-March period.

produce a nitrogen fixing process in the soils where adequate green algae is present.

The flatness of the whole region makes development of hydroelectric power impractical. The only hydroelectric generating plant in Bangladesh is located in the Chittagong Hill Tracts. However, irrigation potential extremely good. Pumping directly from the river provides the most immediate opportunity due to the ease of access to the water and the low lift requirement to raise water to the land. Additionally, the geological structure produces excellent supplies of underground water which are readily available for irrigation. Tubewells, which are common in much of the subcontinent, offer easy access. Shallow tubewells can reach groundwater in most regions of the country at depths up to about 40 feet, but water is commonly available at less than 20 feet (Figure 3). In general, all regions are suitable for shallow tubewell irrigation except for the coastal belt bordering the Bay of Bengal, the Madhupur tract northwest of Dhaka, the Barind tract in North Bengal, and the entire Sylhet and Chittagong Hill Tracts region where deep tubewells generally must be used. The supply of groundwater has not yet been accurately determined, but most estimates indicate that sufficient amounts are available to meet most projected irrigation demands, although deficiencies could arise during the dry season if the rainfall

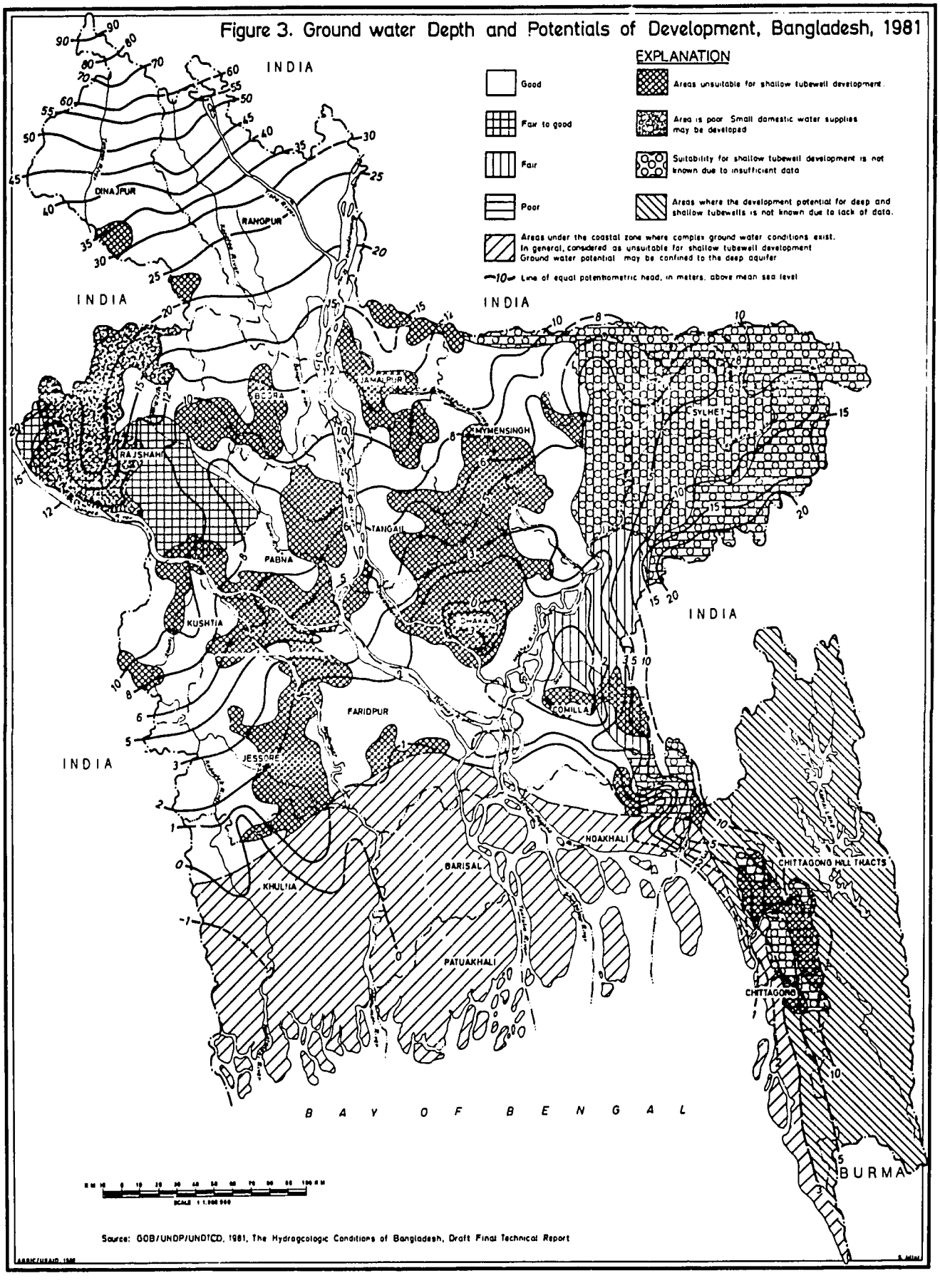


Figure 3. Ground water Depth and Potentials of Development, Bangladesh, 1981
EXPLANATION
Good
Fair to good
Fair
Poor
Areas unsuitable for shallow tubewell development.
Area is poor. Small domestic water supplies may be developed
Suitability for shallow tubewell development is not known due to insufficient data
Areas where the development potential for deep and shallow tubewells is not known due to lack of data.
Areas under the coastal zone where complex ground water conditions exist. In general, considered as unsuitable for shallow tubewell development. Ground water potential may be confined to the deep aquifer
Line of equal potentiometric head, in meters, above mean sea level
INDIA
DINAJPUR
RANGPUR
BOGRA
JAMALPUR
MYMENSINGH
SYLHET
RAJSHAHI
TANGAIL
PABNA
KUSHTIA
DHAKA
COMILLA
FARIDPUR
JESSORE
KHULNA
NOAKHALI
BARISAL
CHITTAGONG HILL TRACTS
PATUAKHALI
CHITTAGONG
BAY OF BENGAL
BURMA
Source: GOB/UNDP/UNDTCD, 1981, The Hydrogeologic Conditions of Bangladesh, Draft Final Technical Report

and the subsequent recharge process were reduced. Also water from the underground acquifers flows into the river system to provide water for navigational needs which may represent a competitive use for water that could limit irrigation, particularly during the dry season. Overall, the potential for irrigation is significant and water is a critically important natural resource in Bangladesh's economic development plans.

Additionally, the vast water resources provide inputs and salt and fresh water habitat for the production and harvest of a wide variety of sea products. Various types of fish and shrimp are important food sources for both local consumption and for export. A significant portion of the population of Bangladesh earn a living from fishing and from the services associated with water transportation which is an essential element of the nation's economy.

The future of the water resources from the river system is in doubt because of a longstanding dispute with India over use rights. All of the rivers found in Bangladesh initially pass through India and the waters from them have historically been used by India's farmers. The construction of a "barge" or diversion dam on the Ganges River at Farakka in 1974 to divert greater amounts for use in India has created great concern in Bangladesh. The dispute has had adverse consequences for Bangladesh in its attempts to develop flood control and electrical generation involving these waters. Several important projects have been delayed or withdrawn due to the uncertainties of water availability resulting from the diversion dam. The impact of reduced flow on water quality, salinity, fish habitat, and navigation are of particular concern to agriculture. The matter has been under constant discussions by the two governments and has even been presented to the United Nations in 1976 for resolution -- all without result. Recently (October, 1982), the two governments agreed to sustain the status quo for 18 months pending further detailed study of the issues.[4]

Other Resources

Bangladesh is not rich in mineral or petroleum resources, but limited amounts are available. Natural gas is the exception. The first discovery of natural gas came in 1955 at Sylhet (Table 2.4). Since then nine additional fields have been proven, the most recent in 1979. The discovery and development of natural gas has occurred entirely in the eastern districts of Sylhet and Chittagong. The resources are estimated at the "likely" level of 9.5-10.6 trillion cubic feet which compares favorably with the gas resources of India and Thailand and even exceeds estimated reserves in France and West Germany. Distribution lines have been developed into Dhaka and Chittagong. However, the Western part of the nation has had no access to natural gas and has been totally dependent on the use of higher cost petroleum products

TABLE 2.4
Operational Gas Fields in Bangladesh, 1955-79

Field	Year of Discovery	Methane Content	Estimated Reserves (TCF)		
			Low	Likely[a]	High
		(% by vol.)			
Sylhet	1955	95.49	0.26	0.29-0.43	0.44
Chhatak	1959	99.05	0.01	0.04	0.07
Rashidpur	1960	98.02	0.49	1.06	2.01
Kailastila	1962	95.70	0.38	0.60	0.95
Titas	1962	96.90	0.83	2.25	4.35
Habiganj	1962	97.80	0.72	1.28	3.70
Bakhrabad	1968	94.03	1.48	2.78-3.70	7.96
Semutang	1969	96.94	0.01	0.03	0.06
Kutubdia	1977	95.72	*	1.00	*
Beguniganj[b]	1979	*	*	0.25	*
Totals			**5.43[c]**	**9.58-10.64[c]**	**20.79[d]**

Source: World Bank, Report No. 3768-BD, March 3, 1982, p. 258.

TCF = trillion (standard) cubic feet. * = not available.

[a]Based on probabilities of 1.0 for proven reserves, 0.5 for probable reserves, and 0.25 for possible reserves.
[b]Offshore field.
[c]For comparison, other countries with estimated gas reserves of similar magnitude are: India--9.3 TCF, Brunei--7.7 TCF, Thailand--8.0 TCF, France--6.3 TCF, and Federal Republic of Germany--6.4 TCF.
[d]Includes "likely" reserves for Kutubdia and Begumganj fields.

for electrical power generation and industrial energy. Completion of an interconnector power line in 1983 will bring gas generated electricity to the Western sections. Gas is currently being used as a raw material for the production of fertilizer (urea), for electrical power generation, and in industrial and residential consumption.

The other principal mineral-bearing regions of Bangladesh are Sylhet-Mymensingh for coal, lignite, limestone and clay; and Rajshai-Bogra for coal and limestone. Only traces of oil have been found. The development of these mineral resources is highly unlikely in the near future due to their limited supply and the low economic returns associated with current prices and extraction costs.

The most important energy resources presently utilized in the agricultural sector are animals for power, plus traditional sources for fuel such as animal dung, wood, and crop residues. About 66 percent of the total energy consumed in agriculture comes from these traditional fuel resources.

Land Utilization

The land resource of Bangladesh totals about 35.3 million acres and is cultivated with moderate intensity (Table 2.5). Based on the total area in 1981, 60 percent is in crop production in a given year, with an additional 4 percent in fallow. These two categories constitute the total land area currently devoted to crops. Forests occupy 15.3 percent of the land and are located primarily in the Chittagong Hill Tracts, the Sundarbans, and the Madhupur Tract. Homesteads, cities, and inhabited lands account for 19 percent of all land use. Only 1.8 percent of the land is considered waste and much of that is potentially reclaimable but at a relatively high economic cost. The land utilization picture of Bangladesh depicts reasonably intense use of this highly limited and important resource. As will be demonstrated in more detail later, the cultivated land is double- and triple-cropped where climate and other conditions permit, which, at present, increases the cultivated area equivalent by about 54 percent.

Based on a comparison with 1973, changes in land utilization have not been significant (Table 2.5). Apparently, some lands moved from fallow to crop production between the two years. A slight reduction in forest area and a slight increase in "not available for cultivation" lands are the only other land use changes of any note. The constant land use pattern seems logically consistent with the substantial production requirements being placed on the resource base. A type of equilibrium seems to have resulted, and no dramatic shifts among land utilization are likely unless significant changes occur in the underlying technical and/or economic determinates of returns to the various uses of land. This does not, however, rule out changes within uses, especially in cropland, as farmers continue to make individual adjustments based on their best options.

Bangladesh's forest resources are surprisingly extensive and produce a considerable variety of woods of importance to the economy. Teak and garjan are found in the Chittagong Hill Tracts area. Mangrove and sundari trees furnish timber from the Sundarbans along with Gewa which is an important source of soft wood. Goran trees are used extensively for firewood and tanning. The Sal tree also is used in construction and is the main wood of the Madhupur Tract.

Land Tenure and Ownership

The present day land tenure system in Bangladesh has its origin in the East Bengal State Acquisition and Tenancy Act of 1951.[5] Under this act the landlord system associated with

TABLE 2.5
Land Utilization in Bangladesh, 1973 and 1981

Type Use	1981 Number Acres (1000s)	1981 Share of Total (%)	1973 Number Acres (1000s)	1973 Share of Total (%)
Total Land Area	**35308**	**100.0**	**35280**	**100.0**
Cultivated cropland	21157	59.9	20841	59.1
Forest	5417	15.3	5507	15.6
Cultivable waste	618	1.8	681	1.9
Current fallow	1404	4.0	1679	4.8
Not available for cultivation	6712	19.0	6572	18.6

Sources: Bangladesh Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, June 1982, p. 18; and Bangladesh Bureau of Statistics, **The Yearbook of Agricultural Statistics, 1976-77**, August 1978.

nglish rule was abolished and cultivators were established as wners. Tenancy was discouraged. The maximum size of land-olding was limited to 33 acres, later increased to 125 acres, nd subsequently returned to the 33-acre maximum.

There are three classes of landownership in Bangladesh: (1) hose who hold homestead land only for their homes with no ultivable lands; (2) those who own and cultivate their own lands nd take in leased lands; and (3) those who own land but lease it o someone else for cultivation. A fourth category of relevance o the tenure structure are those rural residents who own neither omestead nor cultivable land. In total, there are slightly more han 8.5 million households representing 53.4 million people in ural Bangladesh who owned land (other than homesteads) in 1978 Table 2.6). Another 3.5 million households comprising 16.3 illion people owned only their homesteads or no land at all. he landownership pattern was skewed in favor of the larger oldings. Of the total, 48 percent of the households owned farms f 2 acres or less. Their holdings represented only 22 percent f the total land owned by all residents, and averaged 0.14 acres er capita. (This excludes about 29 percent of the households ho held no land (other than homesteads) and are considered andless.) Conversely, the other 23 percent of the households

TABLE 2.6
Size Distribution of Land Owned Other than Homestead Land in Rural Bangladesh,[a] 1978

Number of Acres	Number of Households	Percentage of Total	Number of Persons	Percentage of Total	Area (acres)	Percentage of Total
Zero	3462167	28.78	16332396	23.43	--	--
0.01-1.00	3994542	33.20	21140000	30.33	1653197	8.41
1.01-2.00	1750072	14.55	10422407	14.95	2608915	13.27
2.01-3.00	940116	7.81	6192404	8.88	2337063	11.89
3.01-4.00	596247	4.96	4322184	6.20	2072870	10.54
4.01-5.00	346286	2.88	2645305	3.80	1566362	7.97
5.01-6.00	224067	1.86	1816360	2.61	1230924	6.26
6.01-7.00	159160	1.32	1405858	2.02	1035028	5.27
7.01-8.00	107028	0.89	916639	1.32	808471	4.11
8.01-9.00	84586	0.70	759205	1.09	718271	3.65
9.01-10.00	70431	0.59	649761	0.93	675552	3.44
10.01-11.00	52133	0.43	461599	0.66	548433	2.79
11.01-12.00	39704	0.33	396347	0.57	461919	2.35
12.01-13.00	28656	0.24	294498	0.42	358998	1.83
13.01-14.00	28311	0.24	298641	0.43	386217	1.96
14.01-15.00	16277	0.13	181602	0.26	238338	1.21
Above 15.00	131540	1.09	1468003	2.11	2958617	15.05
Totals	**12031272**	**100.00**	**69703206**	**100.00**	**19659176**	**100.00**

Source: Tomasson Jannuzi and James Peach, **Bangladesh: A Profile of the Countryside**, April 1979, p. 120.

[a]Rural Bangladesh is defined to include the 411 rural Thanas of Bangladesh as listed in the 1974 Census of Population. For purposes of this survey, rural areas in predominantly urban Thanas are not included. Therefore, the total land area and total number of households as reported here should be somewhat less than estimates presented in other data sources.

held 78 percent of the land. The per capita farm size for this group was 0.55 acres. At the extreme, 1.09 percent of the households owned 15 percent of the land, which averaged about 2 acres per capita. The 3 million acres held by the largest owners (1.5 million people) compares to the 4.3 million acres held by those with less than 2 acres (31.6 million people).

A relatively large proportion of rural families own little or no land (Table 2.7). Of the total rural families, 15 percent owned no land at all (1.8 million households). Those who owned only their homestead but no cultivable lands total 14 percent (1.7 million households). A third class, those claiming ownership of no more than 0.5 acres (excluding homestead), add 21 percent to the statistics for households with little or no opportunity to cultivate land. The total of these three categories

TABLE 2.7
Landlessness in Rural Bangladesh, 1978

	Number of Rural Households	Percentage of Total	Number of Rural Persons	Percentage of Total
Landless--1	1767334	14.69	8081266	11.59
Landless--2	1694833	14.09	8251130	11.84
Landless--3	2561410	21.29	13214789	18.96

Source: Tomasson Jannuzi and James Peach, **Bangladesh: A Profile of the Countryside**, April 1979, p. 120.

Definitions: Landless 1--rural household that claims ownership of no land, either homestead land or other land. Landless 2--rural household that does not claim ownership of any other than homestead land. Landless 3--rural household that claims to own some land, but no more than one-half acre of land (excluding homestead land). Thus, the sum of landless 2 households plus landless 3 households equals the total number of rural households claiming to own one-half acre of land or less (excluding homestead land).

represented 6 million households, which was 50 percent of all rural households and 29.5 million people.

The land tenancy situation in rural Bangladesh shows a reasonably high incidence of owners who cultivate their own land (Table 2.8). Of the total households, 65 percent were owners, 28 percent were owners who take in other land under a rental agreement, and 7 percent were pure tenants who operated other lands but own none themselves. About 4.7 million acres, or 24 percent of the total area, were operated by nonowners. Of some note, however, is the fact that about 3.2 million households engage in contractual arrangements to obtain additional lands or work as tenants. Of the lands procured under these arrangements, 45 percent were of two acres or less; 21 percent were for five acres or more. The tenancy contracts typically ran for less than three years, but agreements for more than ten years were not uncommon.[6]

Farms in Bangladesh averaged 3.5 acres in 1977, but there is considerable variation among geographic districts (Table 2.9). The largest average farms (6.2 acres) were found in Patuakhali district in Khulna. The smallest were in Comilla (Chittagong

TABLE 2.8
Number and Area of Rural Households by Type of Tenancy[a]

Class Owner[a,b,c]	Number of Households	Owned Land[e] Percentage of Total	Area (Acres)	Percentage of Total	Land Taken In Area (Acres)	Percentage of Total[g]
Owners	5974206	64.53	14224975	72.36	--	--
Owner-cum-tenant	2597661	28.06	5433642	27.64	3728211	18.96
Tenant[d]	686357	7.41	--	--	921864	4.69
Totals[f]	9258224	100.00	19658617	100.00	4650075	23.65

Source: Tomasson Jannuzi and James Peach, **Bangladesh: A Profile of the Countryside**, April 1979, p. 120.

[a]Number of rural households excluding those households which (a) do not own land other than homestead land, and (b) do not take in land from others.

Classes of owners are defined as follows:

[b]Owner: is a rural household that cultivates its own land either with family labor, hired labor, or a combination of both. Such a household does not take in land from others.

[c]Owner-cum-tenant: is a rural household that claims to own some land (other than homestead land) and, at the same time, has temporary possession of additional land in accordance with the terms of a written or oral agreement specifying the amount due in cash or in kind from the owner-cum-tenant household to the owner(s) of the land taken in.

[d]Tenant: is a rural household in temporary possession of land in accordance with the terms of a written or oral agreement specifying the amount due in cash or in kind from the tenant household to the owner(s) of the land. Such a household does not own any land other than homestead land. See also owner-cum-tenant household.

[e]Owned land excluding homestead land.

[f]Components may not add to totals due to rounding.

[g]Percentage of owned land other than homestead land.

Division) with an average size of 1.96 acres. Dhaka district had the second smallest average farm sizes. Eight districts had average farm sizes in excess of 4 acres.[7] There are circumstantial indicators of a trend toward smaller and smaller farm units. In Bangladesh, farmlands are customarily subdivided among surviving descendants. Islamic law decrees that such division occurs in the absence of a legally prepared will which specifies otherwise. Female children are entitled to participate in the distribution but receive only one half the share of male children. The continual redistribution of a given land unit eventually creates such small holdings that they can become uneconomic. Once this happens, the owners are less able to withstand economic adversity and often lack the staying power to pass through periods of financial stress. As a consequence, many small landholdings are sold and the purchasers are often owners of larger land areas. The dynamics of these two counterveiling

TABLE 2.9
Average Size of Landholding, by Districts, Bangladesh, 1977

District	Number of Farm Holdings (1000s)	Farm Area in Acres (1000s)	Average Size of Farm Holding (acres)
Bangladesh	**6257**	**21959**	**3.50**
Chittagong	**257**	**704**	**2.74**
Chittagong H.T.	49	237	4.85
Comilla	627	1230	1.96
Noakhali	270	775	2.87
Sylhet	419	1691	4.03
Dhaka	**493**	**1342**	**2.71**
Faridpur	391	1299	3.31
Jamalpur	188	687	3.64
Mymensingh	565	1861	3.29
Tangail	204	663	3.24
Khulna	**265**	**1142**	**4.31**
Barisal	325	1230	3.78
Jessore	311	1286	4.13
Kushtia	136	629	4.62
Patuakhali	113	702	6.20
Rajshahi	**391**	**1726**	**4.41**
Bogra	226	704	3.12
Dinajpur	253	1206	4.75
Pabna	213	880	4.12
Rangpur	559	1966	3.51

Source: Bangladesh Bureau of Statistics, **Socioeconomic Indicators of Bangladesh,** September 1981, p. 120.

forces on average farm size for the nation are not known. But it appears probable that the combined outcome is toward concentration of ownership.

The land-use and tenure structure in Bangladesh constitutes a critical element in any agricultural sector or national developmental strategy. First, the land area for agricultural production is essentially fixed, and output can be expanded only by more intensive cropping. Secondly, the significant numbers of landless or rural people with extremely restricted access to agricultural land are a concern since they may in reality be excluded from direct participation in a developmental strategy

oriented toward increasing agricultural output unless employment options are found. Third, the presence of land resources owned in relatively large tracts offer a perceived, even if highly limited, potential for alleviating the plight of the landless and economically disenfranchised through some type of land reform or redistribution.

The overall issues have both economic efficiency and income distribution elements. There is a critical need to increase agricultural production as rapidly and efficiently as possible. At the same time, improving the well-being of the poor is of paramount concern, and land reform is one way to address such equity issues. Yet, land reform programs are characteristically accompanied by initial production decreases due to inefficiencies caused by disruptions in the production and marketing systems. Advocacy of small farms associated with land reform is based in large part on the argument that the farm will be cultivated more intensively by currently landless occupants than by current owners. In Bangladesh, this position is supported by the IFDC study on fertilizer use.

Opposition to land reform is supported by several intractable problems. Aside from the initial fall in production, strong political opposition from the rural power elite could be expected. Furthermore, the redistribution of land, it is argued, would only temporarily alleviate the situation. As population growth continues, the landless problem could be expected to reappear, at least in some degree.

To date, the issue of land reform appears to have been set aside although periodic public responses suggest that the BDG is continuing to weigh alternative options. The need to address the problems cannot be ignored for long nor left outside the framework of the overall development strategy for Bangladesh. A central issue, however, should be to determine whether or not regular developmental programs will be altered to meet the requirements of a special group such as the landless, or whether their needs may be treated best in a welfare context and be accorded a different, separate strategy option.

Agricultural Production Zones

The similarities of landscape and climate across most of Bangladesh combine to make agricultural production reasonably homogeneous. Most crops are produced in every geographic region; yet there are significant microclimates and some geographic variations which can alter the production norm for a specific area and influence production patterns.

Rice and jute dominate the production milieu in the agricultural sector. The lesser crops include tea, sugarcane, oilseeds, fruits, vegetables, spices, wheat, potatoes, tobacco, cotton, and

pulses. Livestock, fish, and forestry are the other major products of the agricultural sector.

Dhaka Division is a wet plain region which produces a wide variety of agricultural products (Table 2.10). Jute acreage is the highest in Dhaka among the four divisions. Boro rice, potatoes, and oilseeds also are widely cultivated. Dhaka has about 27 percent of the total land devoted to all classes of rice. Compared with other regions, Dhaka farmers are least involved in the production of wheat, fruits, and vegetables.

Chittagong Division to the east of Dhaka produces a significant share of most major crops. Practically all of Bangladesh's tea comes from the 150 tea estates in Chittagong which border the rain forests. Sweet potatoes also are grown widely, mostly in Comilla. Chittagong has about one fourth of the nation's acreage committed to rice, fruits, spices, vegetables, oilseeds, and potatoes, respectively. It is the major center for Boro rice production. The lowest acreages are devoted to jute, sugarcane, pulses, tobacco, and wheat. In addition, the region produces many animal skin products, and significant amounts of fish and shrimp for export.

Rajashahi is the "dry land" sector in the Northwest plains region. It has the most diversified agricultural base among the four districts. More than 50 percent of the nation's wheat acreage is located in Rajshahi, primarily in the districts of Rangpur and Dinajpur. Acreages of sugarcane, pulses, tobacco, and potatoes exceed 40 percent of the national total. The largest portion of rice acreage also is located in Rajshahi (28 percent). Only sweet potatoes and boro rice are not extensively grown in the division.

Khulna Division in the Southwest is the least agriculturally involved of the nation's regions. Significant production of fruits, vegetables, sugarcane, and tobacco is found but in no case does the acreage of these crops exceed 30 percent of the total nationally. Only 21 percent of the nation's rice area is planted in Khulna, mostly aman and aus. Potatoes are scarcely grown, and spices and oilseeds are produced sparingly. The heavily forested regions of the Khulna Division produce significant amounts of animal skin products, and large amounts of fish and shrimp are harvested from the extensive river system.

Sociodemographic Characteristics

Bangladesh is a heavily populated nation. Population size and growth are so important to the nation's future that concerns about their potential impacts on overall welfare underly most considerations of developmental strategies. Population censuses were conducted in 1974 and 1981, but issues have been raised about the reliability of the 1974 enumeration. Consequently,

TABLE 2.10
Regions of Production for Selected Crops, Bangladesh, 1980-81 (1,000 acres)

Crop	Total		Dhaka		Chittagong		Rajshahi		Khulna	
	Area	% Total	Area	% Total	Area	% Total	Area	% Total	Area	% Total
Rice	25474	100	6918	27	6142	24	7025	28	5389	21
(Aman)	(14918)	(100)	(3563)	(24)	(3418)	(23)	(4524)	(30)	(3411)	(23)
(Boro)	(2867)	(100)	(1091)	(38)	(1292)	(45)	(276)	(10)	(208)	(7)
(Aus)	(7689)	(100)	(2263)	(29)	(1431)	(19)	(2225)	(29)	(1770)	(23)
Wheat	1461	100	206	14	211	14	773	53	271	19
Jute	1568	100	679	43	107	7	500	32	282	18
Tea	107	100	Nil	Nil	107	100	Nil	Nil	Nil	Nil
Sugarcane	367	100	90	25	24	6	177	48	76	21
Tobacco	127	100	26	21	14	11	55	43	32	25
Major fruits[a]	379	100	67	18	104	27	96	25	112	30
Major vegetables[b]	88	100	13	15	20	24	29	32	26	29
Spices[c]	305	100	82	27	85	28	85	28	53	17
Oil seeds[d,e]	767	100	253	32	135	18	236	31	143	19
Potato	250	100	80	32	53	21	102	41	15	6
Sweet potato	168	100	63	38	54	32	28	16	23	14
Pulses[f]	858	100	220	26	62	7	341	40	235	27
Percentage of land area		**100**		**27**		**22**		**30**		**21**

Sources: Estimates by author based on data sheets provided by the Agricultural Statistics Wing, Bangladesh Bureau of Statistics; and Bangladesh Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, June 1982, pp. 22-36.

Note: The land areas estimated for oilseeds, fruits, vegetables, pulses, and spices vary from those in Table 3.4. The estimates are independent and do not include the same group of crops.

[a]Consists of: mango, banana, coconut, jack-fruit, lichi, pineapple, papaya.
[b]Consists of: summer vegetables, cabbage, cauliflower, tomato, ladys finger, barbati.
[c]Consists of: onion, chillies, ginger, turmeric.
[d]Consists of: rape and mustard, groundnut, linseed, coconut, til, and others.
[e]1979-80 estimate.
[f]Consists of: mung, masur, ashar, khasari, motor, gram, jawdr, and mashkolai.

periodic adjustments have been forthcoming from official sources and from time to time foreign donors make further refinements. The 1981 census is presently in preliminary form but is generally being accepted as more reliable based on more adequate survey techniques used in data collection.

The growth in population for Bangladesh has followed a demographic pattern which traditionally evolves from the health and socioeconomic changes accompanying development in agrarian societies.[8] Crude birth rates (CBR) remained reasonably constant during the first half of the 1900s at a level consistently over 50 per 1,000 population. During the 1960s the rate fell to around 45 per 1,000 and has remained at essentially that level since. Data sources are not fully reliable. But estimates by most of the agencies working with population issues in Bangladesh confirm a decline of this approximate magnitude.

One reason for the relative stability of the CBR is the general absence of control measures. Births tend to occur at something near a biological limit until such time as government programs or socioeconomic conditions cause changes in the underlying value systems of the populace regarding children. The government currently is involved in extensive population control programs designed to reduce the birth rate. The impacts of the programs appear to be encouraging, but the evidence is still accumulating. Data from Bangladesh confirm similar findings from elsewhere that birth rates decline with increased education of parents and with rising incomes, except for those in the lower income groups. For example, the mean number of children "ever born to ever married women" in Bangladesh is estimated at 2.4 for women with university training and 3.4 children for those with primary education. Women with no education average 4.2 births. However, the number of women in the higher educational levels is too small to materially impact on the average CBR for the nation. Other current trends which could reduce the CBR in the future are the increased average age when first married from about fourteen to seventeen years and the slight decrease in the percentage of married women.

The significant surge in population growth in Bangladesh occurred in the early 1960s as a consequence of a marked decline in mortality. The crude death rate (CDR) declined slowly through the 1950s, remaining in the range of about 40 per 1000. The rate dropped to 20-30 deaths per 1,000 population in the early 1960s, and continued to decline to around 15 per 1000 by 1970.[9] Since then, the CDR has continued at about this level. Medical improvements and disease control are the factors most responsible for the declining CDR. As a result, death probabilities for all ages have declined, and life expectancy has now risen to 62 years for males and 56.5 years for females of one year age. The lower expectancy for women is attributed to the eventual impact on health from the abnormal physical stress associated with child birth in Bangladesh.

Rural-Urban Distribution

Population in Bangladesh in 1981 was estimated at 89,940,000. This represents an 18 percent nominal increase over the 76,398,000 estimated for 1974 and a 50 percent increase since 1961[10] (Table 2.11). The population is predominantly rural. In 1981, an estimated 77.3 million (86 percent) Bangladeshis resided in rural regions leaving only 14 percent with residence in urban areas. The 1981 estimates of rural population reflect a downward trend in the percentage of the population in rural areas relative to 1974.

Historically, Dhaka and Chittagong have been the most heavily urbanized districts due primarily to the presence of the nation's two largest cities within their borders. In 1974, Dhaka district was estimated as 31 percent urban while Chittagong was at 21 percent. No official data on the degree of urbanization for the 1981 census are yet available.

Geographic Distribution

The population of Bangladesh is reasonably well-distributed geographically but there are recognizable differences (Table 2.12)--Dhaka division was the most populated in 1981 with 30.2 percent of the total population. Khulna had the lowest population with 19.7 percent. Chittagong and Rajshahi each had about one fourth. Within the divisions, Dhaka, Comilla, Mymensingh and Rangpur were the most heavily populated districts. The Chittagong Hill Tracts had the smallest number of residents.

Population shifts on average have been minimal among geographic regions between 1974 and 1981. Dhaka Division showed a slight increase overall in its relative size and Chittagong a slight decrease. Khulna and Rajshahi retained essentially the same proportions of the total population as in 1974. Interestingly, the Chittagong Hill Tracts district recorded the highest percentage increase in population since 1974 (47 percent). Immigration from other districts as a consequence of a BDG- sponsored settlement program was mostly responsible for the increase. The rapid urbanization around the cities of Dhaka and Chittagong produced the next highest growth rates in these two districts.

Growth Rates

Population growth rates often attract the greatest interest among those interested in population issues. Yet, they are generally the most difficult statistics to estimate, which often precludes widespread agreement. The annual growth rate between 1961 and 1974 was estimated at 2.70 percent, and from 1961 to 1981 at 2.59 percent. Based on the 1981 census, population in Bangladesh grew at an overall annual rate of 2.36[11] percent since

TABLE 2.11
Rural and Urban Population in 1961, 1974, and 1981, Bangladesh (1000s)

Year	Rural	Urban	Total	Rural as % Total
1961[a]	48175	2639	50841	95
1974[a]	69522	6876	76398	91
1981[b]	77348	12592	89940[c]	86

Sources: [a]Sawon Hong, **Demographic Characteristics of Bangladesh**, Dhaka, June 1980, p. 54. (This is a postenumeration estimate); [b]Richmond Allen, "Rural vs. Urban Population Growth Rates," Memorandum dated January 22, 1982; and [c]Postenumeration check estimate from 1981 census of Bangladesh. Reported in **1980 Statistical Yearbook of Bangladesh**, p. 685.

Note: Percentage of urban and total population for 1961 and 1974 are based on estimates reported by Hong. For 1981, the estimate is that of Allen.

1974 (Table 2.13). This reflects a declining trend which, if continued, could bode well for Bangladesh.

Growth rates for urban and rural segments of the population have not been reported for either 1974 or 1981. An independent estimate by USAID indicates that between 1974 and 1981 rural population grew at an annual rate of 1.7 percent and urban population at the rate of 9.5 percent.[12] These figures are consistent with the same source's estimate of a 14 percent urban population for 1981. The high urban growth reflects the growing rural urban migration within Bangladesh. It may also reflect a slightly higher natural growth rate (crude birth rate minus crude death rate) in the urban regions.

If Bangladesh maintains its current growth rate, the population will double in about thirty years.[13] Obviously the need is to achieve an early reduction.

The inertia which is inherent in the dynamics of population change further complicates the problem of rapid population growth. Even if a semblance of control is achieved, the momentum will carry population levels upward for several years. The ideal for Bangladesh would be to achieve "replacement-level fertility," which results in a zero population growth rate. This

TABLE 2.12
Comparison of Total Population by Division, 1974 and 1981

Division	1974 Population (1000s)	1974 Percentage of Total	1981 Population (1000s)	1981 Percentage of Total
Chittagong	19940	26.1	23312	25.9
Dhaka	22767	29.8	27117	30.2
Khulna	15203	19.9	17718	19.7
Rajshahi	18488	24.2	21793	24.2
TOTAL	76398	10.0	89940	100.0

Source: Bangladesh Bureau of Statistics, "Preliminary Report on Population Census, 1981," **1980 Statistical Yearbook of Bangladesh**, p. 686.

occurs when average family size reaches about 2.0 children. Based on 1975-80 data, if Bangladesh achieved this level by the year 2000, population would still continue to rise to a stabilized level of about 206 million in the year 2100 (Figure 4). Postponement of the two-child family to the year 2040 will generate a stable population of about 419 million by the year 2100.

Population Density

Bangladesh's claim to the title of one of the most densely populated nations in the world was enhanced by the 1981 census. Overall, the person/land ratio for the nation's 55,598 square miles was 1,618 people per square mile (Table 2.14). This concentration represents an increase from the 1,374 people per square mile in 1974. Based on cultivated cropland only, the population density was 2,536 per square mile in 1981 or about 4 people per cultivated acre.

Dhaka Division had the heaviest population density of 2,275, and the highest person/land ratio with 30.2 percent of the population and only 21.4 percent of the land area. Chittagong was the least densely populated with 1,349 people per square mile, and Khulna was only slightly higher with 1,358 people per square mile.

Among the districts, Dhaka was the most densely populated with 3,604 per square mile. In contrast, the two least-densely

TABLE 2.13
Comparison of Population Statistics, 1974 and 1981, Bangladesh

Item	1974	1981
1. Population (1000s)	76398	89940
2. Male (1000s)	39623	44850
3. Female (1000s)	36775	42202
4. Sex ratio (males/females)	108	106
5. Number of households (1000s)	12679	15135
6. Average size household	5.64	5.94
7. Density/sq. mi.--incl. rivers	1374	1618
8. Density/sq. mi.--excl. rivers	1470	1731
9. Per capita availability of land (acres)	0.45	0.38
10. Annual growth rate--since 1974 (%)		2.36
11. Annual growth rate--since 1961 (%)	2.70	2.59

Source: Bangladesh Bureau of Statistics, "Bangladesh Population Census, 1981--Preliminary Report," **1980 Statistical Yearbook of Bangladesh**, p. 685.

populated districts were the Chittagon Hill Tracts with only 152 people per square mile and Khulna with 967.

Other Population Characteristics

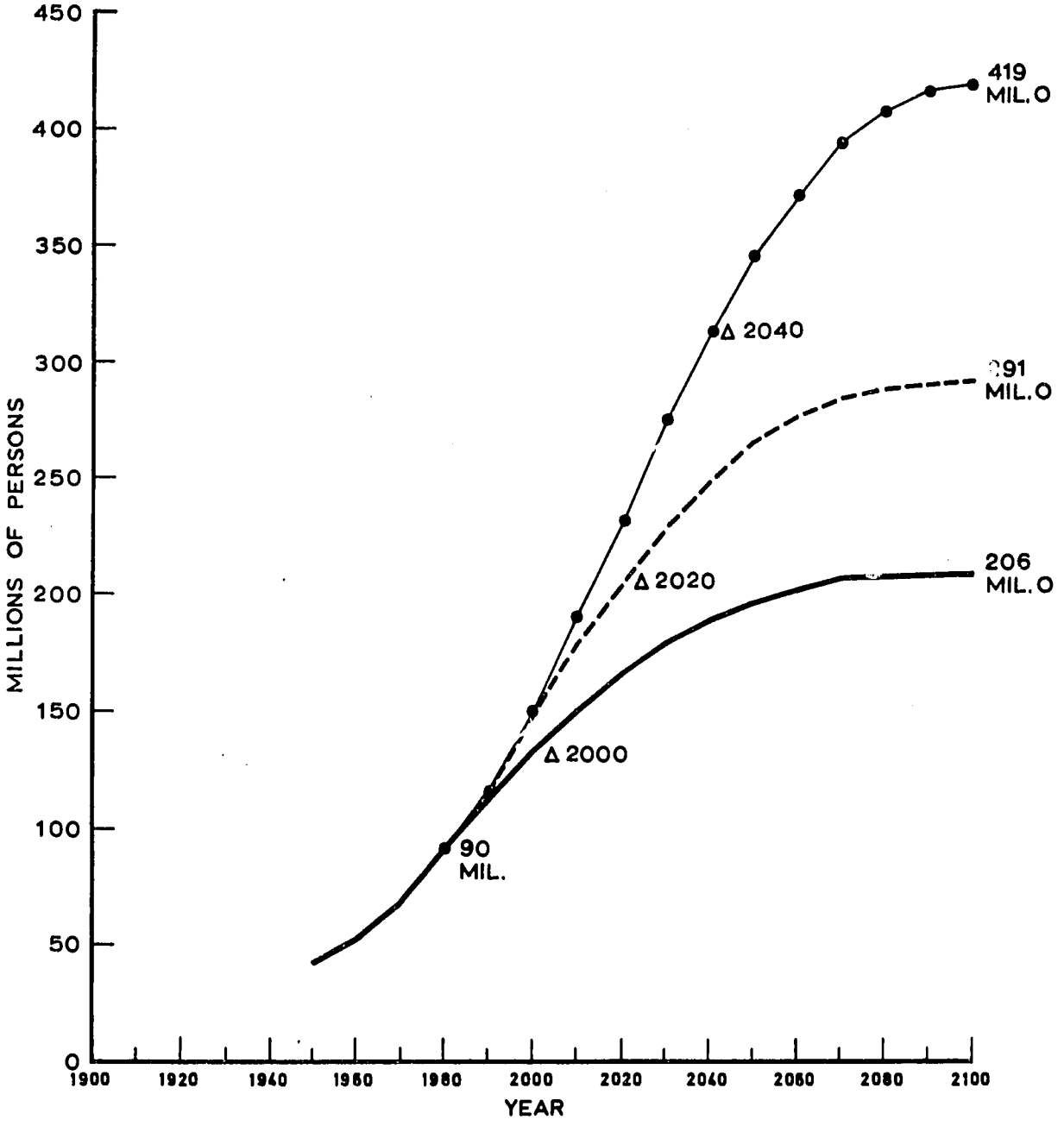
The total population in Bangladesh was composed of 15.1 million households in 1981 as compared to 12.7 million in 1974 (Table 2.13). Average size of household was 5.94 in 1981. Males constituted 52 percent of the 1981 estimate, which was a very slight decrease from 1974.

The age distribution of Bangladesh's population is weighted heavily toward the younger age groups.[14] Most of the population is less than thirty years of age, which adds pressure to an already potent population growth potential. In 1974, an estimated 30 percent were less than nine years of age, and 43 percent were fourteen and under (Table 2.15). Those under thirty comprise 71 percent of the population. At the other extreme, those over sixty years represented 4.4 percent of the total. The ratio of male to female remains fairly constant for all age

Figure 4.

DEMOGRAPHIC MOMENTUM

ALTERNATIVE PATHS OF BANGLADESH'S POPULATION GROWTH



Δ Year Replacement Level Fertility is reached at about 2.0 Children per Family

O Population at Stabilization

Source: Tomas Frejka Population Council

TABLE 2.14
Divisional Distribution and Population Density, Bangladesh, 1981

Division/District	Regional Share of Total Pop.[a] (%)	Land Area Including Rivers[b] (sq. miles)	Regional Share of Land Area (%)	Density/Sq. Mile: People	Density/Sq. Mile: Ratio of People to Land
Chittagong Division	**25.9**	**17283**	**31.1**	**1349**	**0.83**
Chittagong	6.3	2786	5.0	2031	1.26
Chittagong Hill Tracts	0.9	5089	9.2	152	0.10
Comilla	7.9	2592	4.7	2742	1.68
Noakhali	4.4	2033	3.7	1525	1.19
Sylhet	6.5	4783	8.6	1220	0.76
Dhaka Division	**30.2**	**11922**	**21.4**	**2275**	**1.41**
Dhaka	11.5	2880	5.2	3604	2.21
Faridpur	5.5	2669	4.8	1846	1.15
Jamalpur	2.8	1315	2.4	1920	1.17
Mymensingh	7.5	3749	6.7	1803	1.12
Tangail	2.8	1309	2.4	1929	1.17
Khulna Division	**19.7**	**13023**	**23.4**	**1358**	**0.84**
Barisal	5.4	2792	5.0	1727	1.08
Jessore	4.6	2584	4.6	1605	1.00
Khulna	5.0	4630	8.3	967	0.60
Kushtia	2.6	1342	2.4	1750	1.08
Patuakhali	2.1	1675	3.0	1135	0.70
Rajshahi Division	**24.2**	**13370**	**24.1**	**1672**	**1.01**
Bogra	3.1	1501	2.7	1871	1.15
Dinajpur	3.7	2609	4.7	1266	0.79
Pabna	3.9	1906	3.4	1853	1.15
Rajshahi	6.0	3653	6.6	1489	0.91
Rangpur	7.5	3701	6.7	1812	1.12
TOTAL	**100.0**	**55598**	**100.0**	**1618**	—

Sources: [a]"Preliminary Report on Population Census of 1981," **1980 Statistical Year Book of Bangladesh**, p. 687; and [b]**1980 Statistical Yearbook of Bangladesh**, p. 36.

groups except that there is some increase in the relative number of males after age fifty.

The estimates of age distribution for the 1981 census are not yet available. However, there is no reason to believe that the relationships have changed appreciably.

Bangladesh is also a nation uniform in language and, for the most part, in religion. The results of the 1974 census are thought to apply to the present for these categories. About 98 percent of the people speak Bengali, the official language. English is widely spoken, especially among government employees and the more educated segments of the population. Muslims constitute about 85 percent of the population and Hindus about 14 percent. Christians and other minority groups make up the rest.[15] An estimated 26 percent of the population over age fifteen are defined as legally literate, i.e. able to read a

TABLE 2.15
Population by Sex and Age, 1974 (percentage of total population)

Age	Male	Female	Total	Male/Female Ratio
0-4	8.3	7.8	16.1	1.05
5-9	7.1	6.7	13.8	1.06
Subtotal, 0-9	**15.4**	**14.6**	**30.3**	**1.06**
10-14	6.9	6.4	13.3	1.09
Subtotal, 0-14	**22.3**	**20.9**	**43.2**	**1.07**
15-19	5.6	5.3	10.9	1.04
20-24	4.7	4.5	9.1	1.05
25-29	3.9	3.7	7.6	1.06
30-34	3.3	3.1	6.4	1.06
35-39	2.7	2.5	5.2	1.07
40-44	2.2	2.1	4.3	1.07
Subtotal, 15-44	**22.4**	**21.2**	**43.5**	**1.06**
45-49	1.8	1.7	3.6	1.08
50-54	1.6	1.4	3.0	1.12
55-59	1.3	1.1	2.3	1.18
Subtotal, 45-59	**4.7**	**4.2**	**8.9**	**1.12**
60-64	0.9	0.8	1.8	1.11
65 & above	1.4	1.2	2.6	1.12
Subtotal, 60 & below	**2.3**	**2.1**	**4.4**	**1.11**
TOTAL	**51.7**	**48.4**	**100.0**	**1.07**

Source: World Bank, Report No. 3309-BD, February 23, 1981, p. 93.

short statement on everyday life in any language. The literacy rate is estimated to be about three times higher among men.[16]

Population Migration

Rural Rural Migration

Internal migration among the rural regions of Bangladesh is occurring, but likely at a fairly limited rate. Statistical documentation is generally lacking as the basis for quantitative

estimates, so any evaluation of this aspect of agriculture's performance must rely on qualitative appraisals.

Interest in the internal movement of rural residents has relevance to the development process for two reasons. First, migration patterns can cause the geographic distribution of people to become distorted in relation to the resource base, resulting in high density ratios in affected areas. Such concentrations of the populace can lead ultimately to reductions in well being as the resource base becomes less and less capable of responding to the demands placed on it by the people. Redistribution via planned or voluntary settlement programs have become a policy prescription in some regions of the world.[17] Secondly, seasonal labor needs traditionally arise in agricultural production processes. The sector's ability to provide both the quality and mobility of labor to fill these seasonal demands is important if optimum production levels are to be achieved.

The homogeneity of land and people in Bangladesh essentially eliminates the potential for unusually large internal migration. As indicated earlier, the person/land ratios for Bangladesh show some variation among districts, but the magnitudes are generally not great. Furthermore, the opportunities for large-scale permanent migration are extremely limited by lack of land and economic opportunity. Even so, there is some permanent resettlement of rural Bangladeshis. The Chittagong Hill Tracts region had the largest percentage growth in population of any area measured by the 1981 Census and is the least-densely populated district. Much of the increase resulted from internal movement of rural residents in search of improved situations. A major attraction to settlers has been the road construction programs of the BDG in the region which has opened up new jungle land areas to settlement. The migration appears to represent a spontaneous resettlement response which was spawned by the market access related to the road constructions.

Dinajpur has also shown higher than average growth, part of which has resulted from rural immigration. Political migrants arriving from Assam and Maldah as a consequence of local unrest in these regions of India account for some portion of the prior movement of population. Noakhali District is the other region in Bangladesh with a high tendency for migration. Out-migration has been traditional due to the relative dryness and agricultural limitations of the region. Its population growth between 1974-81 was among the lowest in Bangladesh.

Bangladesh has distinct seasonal labor requirements in rural areas related to the major agricultural crops in season. One estimate is that hired labor totals an average of forty to fifty person-day equivalents per acre per year. The farm operations of most significance in utilizing seasonal labor are harvesting (26 percent), weeding (25 percent), transplanting (16 percent), and land preparation (10 percent). Rice produced from High Yield

Varieties (HYVs) and potatoes require a disproportionately high use of seasonal labor.[18]

In the Northwest, peak labor periods occur in late June and early July when transplanted aman rice is placed, and during August when the crop is weeded. Another peak occurs between November and January when the aman crop is harvested and the boro crop is transplanted. This is the most significant period for seasonal labor. The Southern delta districts also experience July-August peaks for planting the aman crop.[19] Based on data from Phulpur, which included all crops of the region (and not just rice), seasonal employment is highest during the aus season (April-August) and slightly less for the aman season (July-December), due mainly to the large acreages of these types of rice. Also the aus season corresponds with labor needs for jute, which is highly labor intensive. The boro season requires about one half the total labor needed during the aus and aman seasons. The intensity of labor use per acre is greatest during the aus and boro seasons.[20]

Jute requirements also have a major impact on the seasonality of labor requirements. The principal needs arise in April-May for land preparation and July-September for harvest.

It appears that the labor resources are available in Bangladesh and that only limited production restrictions are being caused by labor shortages (although definitive data are not available). Based on the estimates of Brundin, no more than 40 percent of the agricultural labor force in Bangladesh, on average, is required to meet the crop production needs of agriculture during the year[21]. Seasonal requirements approach 60 percent of the total labor availability. For the most part, these demands are filled from the local pool of available labor, and the process does not necessitate widespread movement of large numbers of rural people from other districts. Observation confirms, however, that some districts such as Sylhet, Dhaka, Chittagong, Dinajpur, Bogra and the Southern delta region receive migrant labor in substantial numbers during some seasons of the year. Primarily, the immigration is from districts such as Noakhali, Rangpur, Mymensingh, and Faridpur. There are also a few areas where seasonal needs are not totally met. However, there are no conclusive estimates on the magnitude of movement or the reported shortfalls.

The critical issue of rural rural migration which confronts developmental strategies in many developing nations is not a major factor in Bangladesh. The large population and its reasonably homogeneous distribution mitigates against population concentration and unfilled seasonal labor demands. The agricultural sector is responding to seasonal needs, mostly from local labor supplies, although some temporary internal migration does occur. Permanent migration is very limited, but some has taken place to the Chittagong Hill Tracts region.

Rural Urban Migration

Rural urban migration is potentially a more significant problem in Bangladesh than the internal movements of people among rural regions. Excessive migration to urban centers without employment opportunities can lead to unplanned growth and dismal living conditions, as has been the experience in several major cities outside Bangladesh such as Calcutta and Rio de Janiero. Conditions seem ripe for extensive rural-urban migration. First, economic conditions appear to be worsening in the rural areas, as real incomes fall and employment opportunities seem to be faltering.[22] Secondly, the gap between rural and urban wage rates appears to be widening. Finally, unfavorable perceptions of the future in rural areas are likely creating pessimistic views among residents who are mobile and desperate enough to give the urban opportunities a try.

Estimates of the magnitude of movement are not available, but based on Allen's calculation of urban population growth since 1974 and the estimates from the 1981 census, an approximation can be made.[23,24] Allen's estimated annual urban growth of 9.5 percent is composed of both natural increases and in-migration. The difference between the annual urban growth rate and the annual average population growth for the nation (2.36 percent) can be viewed as an estimate of annual urban in-migration (7.14 percent). Using the 1974 urban population estimate of 6.5 million and compounding the growth at 9.5 percent, 5.8 million new residents were in urban areas in 1981 of which about 4 million were immigrants (assuming a migration rate of 7.14 percent). Furthermore, if such a trend were to continue unabated for another five years, the increase in urban residents for the period due to rural urban migration could approximate 6 million more people.

Presumably, these migrants are in search of permanent residence and are in addition to the large numbers of temporary migrants who move seasonally to urban areas in search of off-farm employment. Numerous rural residents go to urban centers during the agricultural "off season" to work as laborers, household employees, and rickshaw pullers. Some even commute daily. No estimates are available of this seasonal rural-urban migration, but it is thought to be significant.

Whether the estimate of rural urban immigration presented here is accurate is uncertain. But the degree to which such migration may exceed the employment options in urban areas will mitigate against a successful developmental strategy. Social unrest and disorder associated with unemployment presents a serious threat to orderly development and should be recognized and dealt with early. The projections of agricultural employment in Chapter 1 convey the strong impression that agriculture will not be able to totally accommodate the increasing labor force even though the sector will continue to be the nation's largest

employer. Development of nonagricultural employment options is critical and should occupy a central role in the strategy for both agricultural and general growth in Bangladesh.

International Migration

Migration of Bangladeshi to other nations has grown steadily since 1976 and has become an activity of considerable importance. Mainly, Bangladeshis have gone to Middle East countries where employment opportunities exist at salaries which are reportedly more than ten times those paid in Bangladesh for equivalent skills. Portions of the salary are remitted to family members in Bangladesh under the program known as the "Wage Earners Scheme" (WES).[25,26] The BDG has actively encouraged such migration as a form of export earnings and as a means of providing income support for Bangladeshi families. Currency received as remittances under the WES can be converted to Taka at auctions which permit local recipients to receive higher than official rates of exchange. Additionally, special import exemptions are provided for selected goods to migrants and their families. Furthermore, it is not uncommon for the receiving nations to send "missions" to Bangladesh to recruit the specific occupational skills in demand abroad. Contract signing, visa clearances, and other formalities are arranged in advance as gestures to encourage this type of migration. In 1982, remittances to Bangladeshi families from members outside the country totalled about $384 million (see Table 1.5). The amount of the remittance represented 61 percent of the merchandise exports for Bangladesh during the same year.

From January 1976 to April 1982, approximately 177,000 Bangladeshis have gone abroad (Table 2.16). Approximately seventeen nations have received these immigrants. Most are predominately Muslim. Migration has been most common into Saudi Arabia, Egypt, Iraq, Oman, and Kuwait. About 79 percent of the migration has been to these nations. Additionally, Qater and Libya have received a goodly number. The trend in numbers has been steadily upward. Based on the initial base year of 1976, there has been a ninefold increase in number of migrants through 1981. The migration in 1980 was 25 percent higher than 1979, and the increase for 1981 (11 percent) indicates that the numbers going abroad are still substantial and rising. The program has suffered by recent exposures of misconduct by local agencies who handle travel and employment arrangements. Likewise, mistreatment of those arriving in some of the foreign countries has been alleged. The BDG has called for a thorough investigation of the system and discussions are reportedly in process to establish an official BDG office to promote international migration and insure that it is administered properly.

TABLE 2.16
Departure of Bangladesh Nationals for Employment Abroad, by Country of Destination, 1976-82

Name of Country	Calendar Year							
	1976	1977	1978	1979	1980	1981	1982[a]	Total
Saudi Arabia	214	1279	3212	6490	8695	13381	5312	38586
U. A. E.	1989	5819	7512	5055	4847	6418	1641	33281
Iraq	587	1238	1454	2362	1927	13153	6522	27243
Oman	113	1442	2877	3777	4745	7351	2939	23244
Kuwait	643	1315	2243	2289	3687	5464	1990	17631
Libya	173	721	2394	1969	2976	4162	1436	13831
Qater	1221	2262	1303	1383	1455	2268	584	10476
Bahrain	338	867	762	827	1351	1392	806	6343
Lebanon, Syria, & Others	512	308	22	25	84	1029	52	2007
Iran	281	339	982	4	2	--	157	1765
Singapore	--	--	--	110	669	1083	--	1862
Nigeria	16	121	6	51	2	17	--	213
Jordan	--	--	--	73	127	66	37	303
Algeria	--	11	17	25	3	--	1	57
Uganda	--	3	2	50	--	--	--	55
Malaysia	--	--	23	--	3	--	--	26
Ethiopia	--	--	--	20	--	--	--	20
TOTAL	**6087**	**15725**	**22809**	**24485**	**30573**	**55787**	**21477**	**176943**

Source: Bureau of Manpower, Employment, and Training, **Monthly Statistical Bulletin of Bangladesh**, June 1982, p. 11.

[a]Up to April 1982.

It is difficult to assess the impact this emigration has on overall productivity within Bangladesh. Estimates of total domestic supply of labor for the various skills and occupations are not readily available. A profile of the migrants has been provided by a World Bank study. For the sample studied: (1) 70 percent were of the ages 20-35; (2) only about 6 percent were illiterate; (3) one-third had entered or completed the primary level of school; (4) one third had completed the secondary level of education; (5) before emigrating, about 20 percent were either unemployed or students and another 31 percent were unskilled; and (6) about 90 percent were employed by the private sector in the Middle East.[27]

It is significant to note, however, that several of the occupational classifications of those exiting Bangladesh fall within professional status (Table 2.17). Engineers, technicians, doctors/nurses, and other professionals constitute 22 percent of the total migrants to date. The largest exit has been by those classified as "Workers" of all skill levels (46 percent). Construction workers also represent a significant number.

TABLE 2.17
Number of Persons Leaving Abroad on Employment, 1976-82

Calendar Year	Construction Worker	Vehicle Driver	Skilled, Semi, & Unskilled Workers	Technicians	Engineers	Doctors Nurses, & Para-Medical	Professional	Catering Workers	Miscellaneous	Total
1976	2366	824	944	359	215	142	211	543	483	6087
1977	1792	567	2898	1466	322	608	836	490	6746	15725
1978	2266	1308	7826	5744	728	381	470	1007	3079	22809
1979	2053	1950	8791	4657	213	148	74	1124	5475	24485
1980	2590	1070	17706	4247	194	274	385	1836	2271	30573
1981	3393	2575	31478	10357	236	273	1905	2653	2917	5578
1982[a]	1428	1565	11711	3635	124	69	615	766	1564	27477
TOTAL	**15888**	**9859**	**81354**	**30465**	**2032**	**1895**	**4496**	**8419**	**22535**	**176943**

Source: Bureau of Manpower, Employment, and Training, **Monthly Statistical Bulletin of Bangladesh**, June 1982, p. 11.

[a]Up to April 1982.

There is reason for concern over the potential impact of this migration on the productivity and maintenance of critical programs in Bangladesh. The number is small in relation to employment in the modern sector. But, as might be expected, adverse effects are coming from the loss of the highly skilled and educated professionals. Particularly, losses of medical specialists, doctors and technicians, engineering technicians and draftsman, and agricultural specialists have been detrimental. The negative impact has been felt on a wide range of domestic areas, especially the services, health, and utilities sectors.[28]

Summary

The natural resource base of Bangladesh is well-suited for year-round production of a diversity of agricultural crops. Temperatures are moderate and favorable for production. Rainfall is extensive (50-140 mm per year). However, the rainfall is variable, and ill-timed arrival or drought can negatively impact foodgrain production. Ground and surface water resources are considerable and have unusually high potential for irrigation development, especially shallow tubewells, deep tubewells, and low-lift pumps. Except for natural gas, other mineral and petroleum resources are lacking. Natural gas offers excellent potentials for alleviating some of the energy needs of the nation, particularly for urea, but most of the development has been in the Eastern districts and access by the Western regions is only now occurring.

Land resources in Bangladesh are extremely limited. Currently, about 64 percent of the land area is used for crop cultivation. Double and triple cropping are practiced in many regions which increases the present land use intensity to about 154 percent.

Land tenure is weighted toward larger land holdings, with 23 percent of households owning 78 percent of the land. An estimated 29 percent of the rural families own no producing farmland. Farms in Bangladesh average 3.5 acres, but 48 percent of the households who own farm land have farms of 2 acres or less, and own only 22 percent of the land.

Agricultural cropland is quite evenly distributed among the four major geographical regions. Most areas of the country produce most crops, although there are some concentrations of production. Among the major crops, rice is produced quite evenly in all divisions, except for the concentration of boro rice in Chittagong. Most jute production is in the Dhaka and Chittagong Divisions. Wheat production is concentrated in Rajshahi.

People are one resource Bangladesh has in abundance. The population pressures are gigantic and impact directly on all aspects of a developmental strategy. The highly skewed age

distribution of the population in favor of those under fourteen will not make it easy to keep future population growth rates under control.

The intense population pressure on the limited land resource gives Bangladesh one of the highest person/land ratios in the world. In 1981, the population totalled 89.9 million and the density per square mile was 1,618. Despite the high person/land ratio, population in Bangladesh is reasonably well-distributed and there are no significant geographic concentrations. The annual population growth rate is estimated at between 2.36 percent and 2.50 percent. Most of the population is rural (86 percent). The urban growth rate is estimated at 9.5 percent, which suggests movement of people from rural to urban areas is occurring. Additionally, some rural-rural migration is taking place in response to seasonal labor needs. Labor resources appear to be sufficient to meet agricultural production needs except in limited instances. A considerable number of people have emigrated from Bangladesh to take advantage of employment opportunities under the BDG sanctioned Wage Earners Scheme. Most of the migration has been to nations of the Middle East.

Footnotes

[1]Clay is baled into bricks and broken into small pieces by hand to provide gravel-type aggregate for concrete production and road maintenance.

[2]Richard F. Nyrop, Area Handbook of Bangladesh, First Edition, The American University Washington, D.C. 1975, p. 79.

[3]Ibid., p. 64.

[4]For a recent discussion of the issues, see: B. M. Abbas A. T., The Ganges Waters Dispute, University Press Limited, Dhaka, 1982.

[5]Nyrop, Area Handbook, 1975.

[6]Bureau of Statistics, Summary Report of the 1978 Land Occupancy Survey of Rural Bangladesh, December 1978, Tables V and VIII.

[7]The average farm sizes reported here are consistent with conventional wisdom about Bangladesh but will differ from average sizes associated with Table 2.6. In the interest of clarity the reader should be aware that the two estimates are in no way comparable. The data in Table 2.6 is from a survey and utilizes "households" as a basic unit. The above estimates are from census data which is based on "farm holdings."

[8]Information for this discussion is drawn from Sawon Hong. Demographic Characteristics of Bangladesh, Dhaka, June, 1980.

[9]The decline in mortality reported by Hong coincides closely with the general case for Asia presented by R. Gwatkin Davidson, and Sarah K. Brandel, "Life Expectancy and Population Growth in the Third World," Scientific American Vol. 246, No. 5, May, 1982, pp. 57-65.

[10]The population estimates for 1974 and 1981 both reflect adjustments for post-enumeration audits. In 1974, the pre-audit population count was 71,479,000. In 1981, the original count was 87,052,000. All estimates in this section for both 1974 and 1981 are based on the post-enumeration audits.

[11]The suspected unreliability of the 1974 census calls into question any calculation of growth rates involving these data. There is some agreement among knowledgeable people that the

population growth rate is actually higher than that reported officially. USAID is using 2.5 percent.

[12]Richmond Allen, "Rural vs. Urban Population Growth Rates," USAID, unpublished Memo, January 22, 1982.

[13]Hong, Demographic Characteristics, pp. 6-7.

[14]Data on age distribution in Bangladesh are thought to be inaccurate due to reporting difficulties and the fact that many people simply do not know their age. See: Hong, Demographic Characteristics.

[15]Bureau of Statistics, Bangladesh Population Census Report, p. 23.

[16]World Bank, Bangladesh: Recent Economic Development and Selected Development Issues, Report No. 3768-BD, March 3, 1982.

[17]See: Michael Nelson, The Development of Tropical Lands, Baltimore: John Hopkins Press, 1973.

[18]G. J. Gill, Farm Power in Bangladesh, Vol. 1, Development Study No. 19, Department of Agricultural Economics and Management, University of Reading, September 1981, p. 191.

[19]Hjalmar Brundin, Food for Work Saturation Level and Constraints to Expansion Study, USAID, Dhaka, October 1978.

[20]A. R. Khan, Employment in Bangladesh During the Second Five Year Plan, Preliminary Projections and Policies, Internatioanl Labor Office, Bangkok, 1979, p. 54.

[21]Brundin, Food for Work, pp. 17-20.

[22]There are conflicting opinions about the deteriorating conditions in rural Bangladesh. For one opinion which argues for less deterioration see: Richmond Allen, "Rural Industries Employment" USAID Memo, dated November, 1979. The Chief Martial Law Administrator has called for specific programs in the rural villages to stop the movement of rural Bangladeshis to the urban areas. Reported in the Bangladesh Observer, April 22, 1982, p. 1.

[23]Studies of migration in Bangladesh are very inadequate and have not specifically addressed the problems of either rural-urban or rural-rural migration. The estimates that do exist generally are inferred from changes in age structure or total numbers in a locality betwen two censuses. One of the most informative studies covers the period 1969-1972 for 100 villages in only one Thana. See Rafiqul Chaudhury, and George C. Curlin,

"Dynamics of Migration in a Rural Area of Bangladesh," The Bangladesh Development Studies, April 1975, pp. 181-230.

[24]Allen, Population Growth.

[25]World Bank, "Labor Migration From Bangladesh to the Middle-East," Report No. 3309-BD, September 29, 1981, p. 354. This report provides a summary of World Bank Staff Working Paper No. 454, which is an in-depth study of the Wage Earners Scheme.

[26]Under the law, migrants must remit 25 percent of their salary but this is difficult to enforce.

[27]World Bank, Labor Migration, p. 253.

[28]Ibid., p. 357.

CHAPTER 3
THE AGRICULTURAL SECTOR--ITS PRODUCTION AND CHARACTERISTICS

"Only when the constraints on growth imposed by the primary reliance on indigenous inputs are released by new factors whose productivity is augmented by the use of new technology is it possible for agriculture to become an effective source of growth in a modernizing economy."

Vernon W. Ruttan
University of Minnesota

Introduction

Agriculture is central to the economy and the society of Bangladesh, but, perhaps more importantly, it represents the basic sector from which overall future economic growth must emanate. About 86 percent of the population live in rural areas and most are engaged in some phase of agriculture--growing, storing, transporting, processing, or marketing. Agriculture in Bangladesh is essentially a rice monoculture. Food production is the most egregious weakness and most persistent need in the economy.

In the aggregate, agricultural production in Bangladesh has demonstrated a general upward trend in the last decade principally due to moderate increases in rice and dramatic increases in wheat production. Annual production changes have been erratic for most crops which reflect, in large measure, the reliance of agriculture on rainfall and the limited use of modern factors of production, especially irrigation. At the same time, the composition of crops produced in the sector has remained essentially static, although some marginal shifts among crops have occurred.

Structure of Crop Production

Between 1973-81, only limited changes occurred in the structure of agricultural production in Bangladesh (Table 3.1). Rice was by far the most important crop in 1973. Other crops of

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TABLE 3.1
Production and Value of Principal Crops in Bangladesh, 1973 and 1981

Major Crops	1973[a] Quantity (m. tons)	1973[a] Value (m. current taka)	1973[a] Rank	1981[a] Quantity (m. tons)	1981[a] Value (m. current taka)	1981[a] Rank
Rice	9.86	18041.1	1	13.66	74064.1	1
(Aman)	(2.27)	(3938.6)	(2)	(7.84)	(15955.2)	(2)
(Aus)	(5.59)	(10366.4)	(1)	(3.24)	(45444.8)	(1)
(Boro)	(2.00)	(3736.1)	(3)	(2.59)	(12664.1)	(3)
Jute	1.20	1366.2	2	0.88	2446.8	5
Potatoes	0.75	813.2	3	0.98	2888.5	3
Oilseeds[b]	0.23	612.2	4	0.25	1994.8	6
Sugarcane[c]	5.32	584.3	5	6.49	2669.0	4
Pulses[d]	0.22	498.0	6	0.21	1675.6	7
Tobacco[e]	0.04	390.7	7	0.05	558.0	10
Wheat	0.09	256.5	8	1.08	3270.4	2
Onion	0.15	117.2	9	0.09	832.5	8
Tea[f]	0.02	75.3	10	0.04	735.3	9
Cauliflower	0.03	21.2	11	0.04	134.8	11
Cabbage	0.03	15.2	12	0.05	102.8	12
Papaya	0.02	10.3	13	0.02	36.5	13

Sources: Directorate of Agricultural Marketing, Ministry of Jute, Bangladesh Bureau of Statistics, Bangladesh Tea Board, Sugar and Food Industries Corporation; Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, June 1982, pp. 22-34; World Bank, Report No. 3768-BD, March 3, 1982, p. 223; and Bureau of Statistics, **Yearbook of Agricultural Statistics of Bangladesh**, 1976-77.

[a]Fiscal years. For example, 1973 is July 1972 to June 1973.
[b]Oilseeds include: rape and mustard, groundnut, til, and others.
[c]Millgate price.
[d]Pulses include: masur, khesari, gram, and mung dal.
[e]Includes Moti-hari variety.
[f]Auction prices at Chittagong.

relative importance, as measured by farmgate value, were jute, potatoes, oilseeds, sugarcane, and pulses.[1] Among the three rice crops, aman (planted in August and harvested in December) was by far the most important in terms of both quantity produced and value of production. The aus crop (planted in April and harvested in July) was next most important but not much greater than the production of boro (planted in December/January and harvested in May/June).

In 1981, rice continued its dominance of the sector's production. The three rice crops had the same order of importance and in essentially the same magnitude. With the rapid expansion of irrigation, however, it is expected that the boro crop will become relatively more important than aus. Among the next five most important crops, jute, potatoes, oilseeds, and sugarcane remained from the 1973 ordering. However, wheat

production made a most dramatic change, increasing from eighth in 1973 to second in 1981. Jute fell from the second most important crop to fifth place due mostly to decreases in production and low world prices. Potatoes maintained their position as the third most valuable crop. There was some shuffling among the other crops, but. for the most part, changes were minor.

The dominance of rice in the sector virtually assures primary stability in the structure of production. Major shifts in the crop mix will be limited as long as rice is so important to the diet of the nation. Also, given that the monsoon climate restricts the crop options, at least for the four months of heaviest rains, the makeup of agricultural production is expected to remain basically the same. Options for crop diversification exist, and the arguments favoring a broader crop base are persuasive. But during the postindependence period, there have been no major BDG initiatives which would alter the monocrop base of the crop structure.

Crop Production Trends

Most major agricultural products have shown increases in production in the past decade. The principal exception is jute. Despite the general upward trends in production, however, few crops have demonstrated dramatic breakthroughs.

Rice

Rice production has shown a general rise but is characterized by weather-induced annual variations (Table 3.2). Total production in 1981 reached an all-time high of 13.7 million tons due to exceptionally favorable weather but then declined somewhat in 1982. Since independence, production declines (as measured by a reduction from the previous year's production) have occurred five times during the period, with the most severe occurring in 1975 and 1977. The 1975 production decline of 5.2 percent was due mainly to a very bad flood which affected the aman crop. The 1977 reduction was 7.9 percent and involved declines in all three rice crops associated with a general drought. Even so, total rice production in 1982 was 3.5 million tons more than in 1973.

The annual growth of rice production between 1973-82 has averaged 2.8 percent, which is considerably higher than the 1.7 percent annual rate from 1961-82. These rates are corroborated by a USAID study which estimates that all foodgrains (including wheat) have grown at an annual rate of 2.1 percent between 1947-79.[2] The trends since independence are distorted by the unusually low production in 1973. For the period 1974-82, the average annual growth rate was reduced to 2.1 percent.

TABLE 3.2
Rice Production in Bangladesh, 1961-82 (1000 long tons)

Fiscal Year	Class of Rice			All Rice	Wheat	All Grains
	Aus	Aman	Boro			
1961	2497	6574	448	9519	32	9551
1962	2328	6652	485	9465	39	9504
1963	2202	6046	482	8730	44	8774
1964	2657	7290	509	10456	34	10490
1965	2501	7262	571	10334	34	10368
1966	2918	6799	618	10335	35	10370
1967	2674	5919	831	9424	58	9482
1968	3069	6812	1114	10995	58	11053
1969	2683	6870	1612	11165	92	11257
1970	2963	6950	1903	11816	103	11919
1971	2863	5912	2192	10968	110	11078
1972	2341	5695	1738	9774	113	9887
1973	2273	5587	2070	9930	90	10020
1974	2802	6699	2220	11721	109	11830
1975	2859	6000	2250	11109	115	11224
1976	3230	7045	2286	12561	215	12776
1977	3011	6906	1650	11567	255	11822
1978	3103	7422	2239	12764	349	13113
1979	3288	7429	1929	12646	486	13132
1980	2809	7303	2427	12539	810	13349
1981	3237	7837	2589	13663	1075	14738
1982	3218	7095	3102	13415	952	14367
Annual compound growth[a]						
1961-82	1.3	0.5	9.7	1.7	18.0	2.0
1973-82	2.5	2.7	3.0	2.8	35.2	3.6
1974-82	1.2	2.0	3.5	2.1	36.5	3.0
1973-74 to 1981-82 (ave.)	2.0	3.1	2.5	2.5	39.2	3.4
1978-82	0.6	-0.4	9.9	1.8	32.3	3.0

Sources: Bangladesh Bureau of Statistics, **Agricultural Production Levels in Bangladesh (1947-72)**, pp. 6-24; and World Bank, Report No. 3768-BD, March 3, 1982, pp. 226-229.

[a]Calculated by least-squares trend line.

Aman is by far the most important of the three rice crops in Bangladesh, accounting for 56 percent of total harvest in the early 1970s. The aus crop represented 23 percent and boro rice

represented 21 percent. Essentially the same distribution has prevailed in the 1980s. Boro rice has grown at a significant 9.7 percent average annual rate since 1961, with the most rapid growth occurring in the 1960s. For the same period, aus production grew at 1.3 percent and aman only 0.5 percent annually.[3] Between 1973-82 boro production slowed to 3 percent annually, but aman rose to 2.7 percent and aus to 2.5 percent. It is interesting to note that with the favorable weather conditions in 1981, growth rates from 1980 were 15.2 percent for aus, 7.3 percent for aman, and 6.7 percent for boro over the previous year. It is also significant that the growth trends since 1978 diverge from those of other postindependence periods. Boro grew at 9.9 percent annually during 1978-82 mainly due to rising irrigation usage. Aus production, on the other hand, increased only 0.6 percent, and aman, the nation's most important rice crop, had a slightly negative growth rate.

Clearly, the growth in production of boro rice has been critical to meeting the rising food needs of Bangladesh from as far back as the late 1960s, but it is the trends in the dominant aman crop which must be of concern. Both its long-term growth since 1961 and for the more recent period are disappointing. It is anticipated that the development of irrigation facilities (as discussed later) may assist the output of aman, as well as the aus crop, by removing some of the risks associated with uncertain water availability. Clearly, the agricultural sector cannot expect dramatic progress to occur so long as its two largest crops are lagging and not providing a stimulus for general growth.

Wheat

Wheat production has shown the most significant change among all crops (Table 3.2). Wheat output has increased ninefold in the last decade. The sustained expansion of wheat production began in 1976, although significant changes began to occur as early as 1970. The 1982 production level represents about 7 percent of all foodgrain production in Bangladesh.

A major contribution to this extraordinary expansion has been the adoption of high-yield varieties (HYVs). The rise in production is also indicative of new management practices by farmers who plant wheat immediately following the aman harvest to utilize the residual soil moisture and who increasingly use fertilizers. The annual growth has been sustained generally at significant levels through recent years. The 1981 record production of 1.08 million tons was 33 percent above the 1980 output and followed a 65 percent increase in production between 1979-80. While production for 1982 was down by 13 percent from 1981, it was still the second largest crop on record. The longer term growth trends in wheat production have been dramatic, with

an average increase since 1961 of 18 percent annually and since 1973, 35.2 percent.

Jute

Jute production has shown a very erratic output cycle since 1973 which is mostly related to the fluctuations in world market prices and the ease with which substitution between jute and aus rice can occur (Table 3.3). Farmers traditionally alter their production between these crops depending on relative profitability.[4] Jute production in 1982 totalled 4.65 million bales which was down 6 percent from the 1981 output of 4.94 million bales. This continues a production decline that began in 1979. Production has shown a slight average annual decline of 0.04 percent since 1973 with especially low production in 1975 and 1976. These trends are of special concern given the basic importance of jute in Bangladesh's export trade.

Other Crops

Among the other crops, major production advances were recorded by tea and potatoes. Since 1973, tea has had an annual growth of 6 percent, which reflects grower response to the generally favorable international prices of the past ten years. The production trend has been upward except for a major decline in 1980. Potatoes were the other major crop with a substantial increase in production during the period. The 1982 output was at record levels and was 9.1 percent above the 1981 production. Since 1973, the average annual growth has been 3.5 percent. None of the other major crops increased at an annual rate equal to the population growth (2.5 percent).

Sources of Increases in Crop Production

Changes in total output of the agricultural sector are a function of changes in either land area, intensity of land use (through multiple-cropping), crop yields, or some combination of all three. In Bangladesh, the potentials for increasing the land area are extremely restricted in the traditional sense of adding new lands since all but the most marginal lands are now under cultivation. Increased agricultural production is almost totally reliant on intensifying land use via double- or triple-cropping, and increasing output per unit of land through the use of modern factors of production.

TABLE 3.3
Production of Selected Agricultural Crops in Bangladesh, 1973-82

Product	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Annual Compound Change[c] 1973-1982
											(Percentage)
Jute (mil. bales)[a]	6.51	6.00	3.43	3.94	4.81	5.36	6.44	5.95	4.98	4.65	(-0.04)
Tea (mil. lbs.)	53.16	60.00	70.92	64.79	73.98	81.62	84.45	80.71	87.85	NA	5.97[d]
Tobacco (1000 tons)	39.46	40.94	39.73	44.46	62.53	49.09	43.05	38.90	47.00	50.24	1.65
Sugarcane (mil. tons)	5.32	6.34	6.64	5.89	6.40	6.60	6.83	6.57	6.49	7.02	1.88
Potatoes (mil. tons)	0.75	0.72	0.87	0.89	0.72	0.85	0.90	0.90	0.98	1.07	3.53
Oilseeds[b] (mil. tons)	0.23	0.21	0.24	0.24	0.24	0.26	0.26	0.25	0.25	0.25	1.32
Pulses[b] (mil. tons)	0.22	0.21	0.22	0.22	0.23	0.24	0.23	0.21	0.21	0.20	(-1.52)

Sources: Bureau of Statistics, **Yearbook of Agricultural Statistics of Bangladesh**, 1979-80; Bureau of Statistics, Agricultural Statistics Wing; Bangladesh Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, June 1982; and World Bank, Report No. 3768-BD, March 3, 1982, p. 223.

NA = not available.

[a]One jute bale = 400 pounds.
[b]Includes oilseed and pulse crops indicated in Table 3.5.
[c]Calculated by least-squares trend line.
[d]Calculated for only 1973 to 1981.

Land Use

Total land in production (including fallow lands) increased only slightly from 22.52 million acres in 1973 to 22.60 in 1981 (Table 3.4). During the same period the total cropped area rose from 30.21 million to 32.41 million acres due to increased multiple-cropping. Thus, the intensity of land use has shown a continual upward trend since 1973.[5] In 1981, the cropping intensity was 154 percent, which is up considerably from the intensity of 145 percent recorded in 1973. Overall, intensity of land use rose by an average of 0.83 percent annually for the period.

Increases in multiple-cropping are highly correlated with those crops which experienced significant production increases during the period. Three crops (wheat, rice, and potatoes) account for practically all of the increase in intensity of land utilization through multiple-cropping between 1973-81. Wheat increased by 1.16 million acres, from 300,000 to 1.46 million acres. Rice acreage rose by 1.67 million acres, while potato acreage was up by 60,000.

Jute recorded the only major decline in land usage, losing about 500,000 acres over the nine-year period. Significant annual variations in jute land usage have occurred, ranging from the high in 1973 of 2.22 million acres to a low of 1.28 million acres in 1976. Such changes reflect the relatively easy substitutability of jute for other crops (mainly aus rice) in response to fluctuating world market conditions. The plight of jute is a demonstration of the point made earlier regarding the dangers associated with basing export earnings heavily on one agricultural product.

Rice utilizes most of the land. In 1981, rice occupied 79 percent of the total cropped area (including multiple-cropping). Despite its decline in usage, jute was still the second most important user of land at 4.8 percent while the dramatic rise in wheat production made it almost as important as jute at 4.5 percent. The surge of wheat acreage from eighth place in 1973 to third place was the only major shift. During the period, all other crops maintained their relative positions with respect to land use.

Crop Yields

Crop yields have demonstrated the same erratic behavior as crop production and for much the same reason, weather variability (Table 3.5). Modest to high increases in yields have been realized for the principal crops. From 1973-81, wheat yields increased 136 percent or an annual average of 11 percent. Rice yields rose at an annual rate of 1.6 percent. Aus rice showed the most significant improvement (2.5 percent annually), and aman yields rose by 1.9 percent each year. Boro rice had only a 1

TABLE 3.4
Changes in Land Utilized for Agricultural Crop Production, Bangladesh, 1973-81 (million acres)[a]

Crops	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1973-1981 Total Change	1973-1981 Annual Compound Growth[b]	1973-1982 Total Change	1973-1982 Annual Compound Growth
											(Percentage)			
Rice	**23.80**	**24.41**	**24.20**	**25.53**	**24.42**	**24.78**	**24.99**	**25.11**	**25.47**	**25.85**	**7.0**	**0.65**	**8.6**	**0.72**
(Aus)	(7.24)	(7.68)	(7.86)	(8.45)	(7.95)	(7.82)	(8.00)	(7.51)	(7.69)	(7.77)	6.2	0.22	7.3	0.14
(Aman)	(14.12)	(14.13)	(13.47)	(14.24)	(14.36)	(14.26)	(14.34)	(14.76)	(14.91)	(14.85)	5.7	0.78	5.2	0.80
(Boro)	(2.44)	(2.60)	(2.87)	(2.84)	(2.11)	(2.70)	(2.65)	(2.84)	(2.87)	(3.22)	18.[illegible]	1.21	32.0	1.97
Wheat	0.30	0.31	0.31	0.37	0.40	0.47	0.65	1.07	1.46	1.32	366.7	21.67	340.0	21.57
Barley	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.04	(-16.7)	(-3.00)	33.3	(-3.90)
Other cereals	0.18	0.18	0.18	0.17	0.16	0.16	0.15	0.14	0.14	NA	(-53.3)	(-3.58)	NA	NA
Pulses	0.78	0.70	0.77	0.75	0.82	0.84	0.84	0.82	0.80	0.55	2.6	1.45	29.5	(-0.92)
Oilseeds	0.74	0.69	0.76	0.77	0.77	0.81	0.82	077	0.76	0.75	2.7	1.07	1.4	0.67
(Rape and mustard)	(0.47)	(0.44)	(0.49)	(0.48)	(0.48)	(0.51)	(0.53)	(0.48)	(0.50)	(0.48)	6.4	1.22	2.1	0.81
(Til)	(0.12)	(0.11)	(0.13)	(0.13)	(0.13)	(0.14)	(0.12)	(0.12)	(0.09)	(0.10)	(-25.0)	(-1.61)	(-16.7)	(-2.17)
(Linseed)	(0.29)	(0.31)	(0.35)	(0.35)	(0.36)	(0.36)	(0.36)	(0.36)	(0.37)	(0.37)	27.6	2.54	27.6	2.24
(Groundnut)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	NC	1.84	(-16.7)	0.78
(Coconut)	(0.06)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	16.7	2.08	16.7	1.79
Betelnut	0.09	0.09	0.09	0.09	0.09	0.09	0.09	--	--	0.09	NC	NC	NC	NC
Betel leaves	0.03	0.03	0.03	0.03	0.03	0.03	0.03	--	--	0.03	NC	NC	NC	NC
Jute	2.22	2.20	1.42	1.28	1.60	1.81	2.05	1.87	1.57	1.41	(-29.3)	(-1.31)	(-36.5)	(-2.12)
Spices	0.38	0.35	0.38	0.38	0.37	0.39	0.39	0.38	0.38	0.37	NC	0.54	2.6	0.28
Sugarcane	0.32	0.36	0.38	0.33	0.36	0.38	0.38	0.36	0.37	0.40	15.6	1.21	25.0	1.47
Potato	0.20	0.20	0.23	0.24	0.20	0.22	0.24	0.24	0.25	0.26	25.0	2.43	30.0	2.60
Sweet potato	0.16	0.15	0.16	0.18	0.17	0.18	0.18	0.18	0.17	0.16	6.3	1.72	NC	0.93
Fruits & vegs.	0.58	0.60	0.61	0.63	0.63	0.64	0.65	0.67	0.66	NA	13.8	1.66	NA	NA
Cotton	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.04	NC	(-1.15)	100.0	3.85
Tea	0.11	0.11	0.11	0.07	0.10	0.11	0.11	0.11	0.11	NA	NC	0.76	NA	NA
Tobacco	0.12	0.12	0.11	0.12	0.17	0.14	0.12	0.11	0.13	0.14	8.3	0.65	16.7	1.07
Others	0.17	0.12	0.10	0.13	0.09	0.09	0.09	0.10	0.10	NA	(-41.2)	(-5.27)	NA	NA
Total crop area	**30.21**	**30.68**	**29.92**	**31.14**	**30.44**	**31.19**	**31.85**	**31.98**	**32.41**	**NA**	**7.3**	**0.87**	**NA**	**NA**
Land in crop production[c]	22.52	22.53	22.57	22.56	22.55	22.53	22.56	22.58	22.60	NA	0.4	0.03	NA	NA
Cropping intensity (percentage)[d]	145	146	146	148	149	151	153	153	154	NA	6.2	0.83	NA	NA

Sources: Bangladesh Bureau of Statistics; and World Bank, Report No. 3768-BD, March 3, 1982, p. 222.

NA = not available. NC = no change.

[a]Rounded to nearest 1000 acres.
[b]Calculated by least-squares trend line.
[c]Including current fallow.
[d]Total crop area divided by land in production (excluding fallow) x 100 = cropping intensity.

TABLE 3.5
Yield per Acre for Principal Crops in Bangladesh, 1973-82

Crops	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Compound Annual Growth[e] 1973-82	Compound Annual Growth[e] 1973-74 to 1981-82 (ave.)
	(maunds per acre)											
Rice	11.3	13.1	12.5	13.4	12.9	14.0	13.8	13.6	14.6	13.1	1.6	1.7
Aus	8.5	9.9	9.9	10.4	10.3	10.8	11.2	10.2	11.5	11.3	2.5	2.3
Aman	10.8	12.9	12.1	13.5	13.1	14.2	14.1	13.5	14.3	13.0	1.9	2.1
Boro	23.6	23.3	21.3	21.9	21.3	22.6	19.8	23.3	24.6	26.2	1.0	1.0
Sugarcane	456.6	473.6	475.8	487.5	487.8	472.8	485.6	480.7	480.9	480.5	0.4	0.3
Potato	103.4	98.9	101.7	102.1	103.1	104.0	102.0	103.1	107.0	110.9	0.8	0.7
Wheat	8.2	9.7	10.1	15.8	17.6	20.0	20.2	20.6	20.0	19.6	11.0	12.6
Oilseeds[b]	8.3	8.2	8.2	8.4	8.2	8.2	8.7	8.7	8.7	9.0	0.9	1.2
Pulses[c]	7.6	8.1	7.9	7.9	7.6	7.7	7.3	7.1	7.0	NA	(-1.5)[a]	(-1.9)[a]
Tea	5.7	6.6	8.1	12.9	8.8	9.3	9.6	9.2	9.8	NA	5.4[a]	3.6[a]
Tobacco	9.2	9.7	9.6	10.0	10.1	9.7	9.5	9.5	10.0	10.6	1.0	0.7
Jute	14.7	13.7	12.3	15.4	15.0	14.9	15.7	16.0	15.7	16.0	1.9	2.6
Papaya	90.5	84.6	99.0	81.0	82.2	83.6	82.2	78.9	80.0	87.2	(-1.2)	(-1.6)
Pineapple	99.0	99.0	104.7	104.6	106.5	106.8	103.5	104.3	115.2	115.4	1.5	1.2
Mango	89.0	79.0	75.2	68.7	67.6	63.8	53.7	51.8	50.4	NA	(-6.9)[a]	(-7.2)[a]
Cabbage	79.0	79.4	82.6	82.0	81.6	86.5	83.7	94.9	84.6	86.2	1.2	1.6
Cauliflower	70.8	71.8	75.4	75.4	72.4	74.1	76.6	76.8	77.0	81.4	1.2	1.1
Jack-fruit	117.7	117.6	115.9	115.0	118.2	117.1	110.0	109.1	109.5	108.0	(-1.0)	(-1.2)
Banana	169.2	170.2	169.3	168.5	169.1	168.3	169.2	170.9	175.8	175.0	0.4	0.3
Spices[d]	23.1	23.7	21.8	22.1	21.0	21.2	20.7	21.2	NA	NA	(-1.5)	(-1.6)

Sources: Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, May 1973 (for 1973 figures); Bureau of Statistics, personal interview by author (for 1982 figures); and World Bank, Report No. 3768-BD, March 3, 1982, p. 224.

NA = data not available for each year, 1973-82.

[a]Estimate for 1973-81 only.
[b]Includes: til, rape and mustard, groundnut, linseeds, coconut, castor, sunflower, and other oilseeds.
[c]Includes: gram, arhar, mung, masur, mashkalai, kheshari, gari kalai, motor, and other pulses.
[d]Includes: chillies, onion, garlic, turmeric, ginger, corriander seeds, other condiments and spices.
[e]Calculated by least-squares trend line. (World Bank, Report No. 3768-BD, March 3, 1982, p. 224.)

percent annual increase in yield, but boro had already experienced significant improvement in yields during the 1960s to relatively high levels, so additional increases were more difficult to achieve. Tea was the only other crop which demonstrated a major improvement in yield.

Despite the low growth in yield for boro rice, its yields are considerably higher than for the other types of rice produced in Bangladesh. At a level of 24.6 maunds per acre in 1981, boro yields approach those attained by several of the more advanced rice-producing nations. However, the yields of aus and aman, irrespective of their rising average yields, are still far below the levels needed to meet Bangladesh's growing food needs. Several factors contribute to this deficiency. The most obvious, and the one least subject to control, is the weather. The extremes, which can produce devastating floods, winds and especially drought, have a direct impact on the aman and aus crops. A principal reason for the low yields is lack of water control and irrigation, which make investments in HYVs, fertilizer, and improved cultural practices less attractive.

Of some interest is the large number of crops which showed decreases in yields per acre. Five crops had some decline, mostly among fruits and vegetables. Several others showed only slight increases. Despite its poor production performance and reduced acreage, jute registered a small increase in yield.

The higher yields for some crops and decreased yields for others suggests that changes in the mix of inputs have occurred since 1973. An issue of considerable importance to the development of agriculture is the extent to which expanded production has resulted from the use of modern factors of production. In a land-scarce economy such as Bangladesh, one would expect a strong movement by producers towards technological change which would increase the productivity of the scarce factor (land) as opposed to adoption of technologies which increase the productivity of the surplus factor (in this case, labor). The most efficient strategy for moving along such a path of technical change would be to alter the input mix by adopting biological/chemical types of innovations which increase yields per acre.

The Effect of Technical Change

The data on yields and land use provide a basis for estimating the impact which changes in the factor mix have had in boosting agricultural production since 1973.

The general methodology and logic for explaining the sources of change in output are as follows. If crop production was calculated using the land area in production in 1981 and the yield for 1973, the result would be an estimate of the total production that would have existed in 1981 if the technology which generated the 1973 yields had remained unchanged. The difference between the actual 1981 production (which reflects

1981 yields and technology) and the surrogate production using 1973 yields would indicate the degree to which adoption of new technologies has influenced production.[6] By an analogous process, the change in production due solely to changes in land can be calculated. The algebraic formulas below are an expression of this basic logic, with the addition of calculations for differences in production associated with changes in cropping patterns and the interaction of cropping pattern and yields.[7]

The components which explain the changes in output between two periods for an individual crop can be broken down algebraically as follows:

Change in total output:	$P_t - P_o =$
Change in acreage:	$Y_o[A_t(1 + C_o - C_t) - A_o] +$
Change in yield:	$[A_t(1 + C_o - C_t)(Y_t - Y_o)] +$
Change in cropping pattern:	$[A_t Y_o(C_t - C_o)] +$
Change in interaction of cropping pattern and yield:	$[A_t(Y_t - Y_o)(C_t - C_o)]$

where,

P_o = Crop output in 1973-74 (average for two years)
P_t = Crop output in 1981-82 (average for two years)
A_o = Crop area in 1973-74 (average for two years)
A_t = Crop area in 1981-82 (average for two years)
C_o = The proportion of total cropped area planted to an individual crop in 1973-74 (average)
C_t = The proportion of total cropped area planted to an individual crop in 1981-82 (average)
Y_o = The crop yield in 1973-74 (average for two years)
Y_t = The crop yield in 1981-82 (average for two years)

Given these equations, it is possible to calculate the relative importance of changes in: (1) acreage, (2) yield, (3) cropping patterns, and (4) interaction of cropping pattern and yields, in explaining the average change in output occurring between 1973-74 and 1981-82. Yields are a surrogate for the different packages of technology available in each of the two periods, and changes in yield reflect acceptance by producers of the new mix of technologies. The influence of acreage is that due to an absolute change in the total amount of land utilized by a given crop. Where land use is highly intensive, as in Bangladesh, it is likely that most of the change in acreage is in fact land which has come under more intense use via multiple-cropping. Such changes have their base in the adoption of new technologies which make it possible to grow an additional crop on the same parcel of land during other growing seasons. It should be kept in mind that the change in output is taken as a given. Within this parameter, the analysis expresses the relative importance of each of the four factors in explaining the change in

output for each crop but does not explain why the output was at a particular level.

Analysis of selected major crops shows an interesting variation in the relationship of acreage and yield relative to production increases for the period. The basic data for the fifteen crops is shown in Table 3.6. The crops analyzed represented 95 percent of the cropped area for Bangladesh in both 1973-74 and 1981-82.

Several of the crops demonstrate important changes in the resource mix (Table 3.7). For example, wheat production increased to slightly over 1 million tons (924 percent increase) between 1973-74 and 1981-82. Of the total increase, 58.8 percent was associated with improved yields and 37.4 percent with rising acreage. Also, aus rice production rose by 689 thousand tons and aman rice by 1.3 million tons. Approximately 87.5 percent of the increase for aus and 75.8 percent for aman was related to yield improvements. Boro rice production, which rose by 700 thousand tons for the period, was associated mostly with expanding acreage through multiple-cropping (60.2 percent). The highest impact of acreage for major crops, however, was for potatoes and jute. Potato production increased by 39.8 percent (236 thousand tons), and 75.9 percent of the change was related to shifts in acreage. Jute production, on the other hand, decreased by 23.4 percent (261 thousand tons), but 130.7 percent of the change was associated with a decline in acreage which offset the limited positive impact of improved yields (40 percent). Interestingly, the reverse was true for tea where 102 percent of the output increase was related to yield improvements which were partially offset by a slight decline in acreage (2 percent). In no cases did the effect of changes in cropping pattern or the interaction of yield with cropping pattern prove to be of major importance.

Calculation of an overall average for the composite of crops is not meaningful since there is no common denominator for aggregating the different crops.[9] Nonetheless, the impression is clear that for most of the major crops, yield increases have been relatively more important, regardless of the level of increased output which reflects the adoption of new technologies and inputs. Even in cases where acreage expansion contributed significantly, such as with boro rice and potatoes, the expansion of land area has its genesis in a changing resource mix of improved inputs which makes it possible to intensify land use through multiple-cropping. Most notable for these crops is the increased use of irrigation which has made it feasible to plant during the winter season.

Data are not available to analyze the nature of the input factor mix or the reasons for change or lack of change during the period. One is left to qualitative appraisal of the reasons for the overall low levels of output response. As was suggested previously, however, the rate of technological adoption in agriculture has been low. Where output has improved, improved

TABLE 3.6
Average Production, Acreage, and Yields for Selected Crops in Bangladesh, 1973-74 and 1981-82

Crops	1973-74 (Average)			1981-82 (Average)		
	Acreage (1000 acres) A_o	Yield (tons/acre) Y_o	Production (1000 tons) P_o	Acreage (1000 acres) A_t	Yield (tons/acre) Y_t	Production (1000 tons) P_t
Aus	7461	0.340	2538	7731	0.417	3227
Aman	14127	0.435	6143	14886	0.502	7466
Boro	2515	0.853	2145	3043	0.935	2845
Wheat	301	0.329	99	1390	0.729	1014
Jute	2206	0.506	1117	1490	0.574	856
Sugarcane	341	17.097	5830	383	17.648	6759
Masur	152	0.283	43	196	0.245	48
Other pulses	588	0.294	173	588	0.277	163
Potato	197	3.721	733	257	3.988	1025
Sweet potato	154	4.247	654	166	4.139	687
Rape & mustard	455	0.224	102	498	0.243	121
Onion	77	1.948	150	79	1.418	112
Tobacco	115	0.348	40	131	0.366	48
Tea[a]	110	0.218	24	109	0.358	39
Total acres	28978			31129		

Sources: Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, May 1975 for 1973-74 data; and Bureau of Statistics, Agricultural Wing for 1981-82 data.

[a]Data is for 1973 and 1982 only.

TABLE 3.7
Relationship of Yield and Acreage to Changes in Average Output for Selected Crops, 1973-74 and 1981-82

Crop	Change in Output for Period	Source of Change				
		Acreage	Yield	Cropping Pattern	Inter-action	Total
	(Percentage)					
Aus Rice	27.1	16.8	87.5	(-3.5)	(-0.8)	100
Aman Rice	21.5	29.5	75.8	(-4.6)	(-0.7)	100
Boro Rice	32.6	60.2	35.8	4.1	0.4	100
Wheat	924.2	37.4	58.8	1.7	2.1	100
Jute	(-23.4)	(-130.7)	40.0	(-8.2)	(-1.1)	(-100)
Sugarcane	15.9	76.9	22.7	0.4	*	100
Masur	11.6	247.8	(-148.8)	1.2	(-0.2)	100
Other pulses	(-5.8)	2.4	(-100.1)	(-2.4)	0.1	(-100)
Onions	(-25.3)	10.3	(-110.3)	*	*	(-100)
Rape & mustard	18.4	50.6	49.3	0.1	0.1	100
Potato	39.8	75.9	23.5	0.6	*	100
Sweet potato	5.0	154.6	(-54.6)	0.3	(-0.3)	100
Tea	44.4	(-2.0)	102.0	*	*	100
Tobacco	20.0	69.4	30.4	0.2	*	100

*Less than 0.1 percent.

technology has generally been responsible as demonstrated by this analysis. But, traditional methods still dominate too much of the sector's production for most crops. This explains much of the reason for the sector's moderate performance during the last decade.

Price Trends for Principal Crops

The trend in wholesale food prices has been upward since 1973 (Table 3.8). Between 1973-81, the wholesale price index for food increased from 176 to 545, or at an average annual rate of 12.3 percent.[10]

The increase in wholesale price has not been uniform for all products. Among the major products, the wholesale price for tea grew at the highest annual trend rate, 27.4 percent. Jute prices rose at the rate of 11.3 percent and rice prices at 9.3 percent for fine, 8.9 percent for medium, and 8.2 percent for coarse quality. Potatoes had one of the lowest wholesale price rises at 6.2 percent annually, which reflects the relatively large increases in production.

The wholesale prices of most of the major agricultural crops have increased at a slower rate than the index of wholesale prices for all products in Bangladesh (Table 3.9). The relative prices for rice, wheat, jute, and potatoes have all declined, with wheat and potatoes showing the greatest declines. Only the price for tea increased faster than the index of prices for all products.

The price performance for wheat is especially noteworthy since a large expansion in production has accompanied the change. Total production increased substantially while relative prices have fallen in what is an excellent demonstration of what is needed to spawn general development throughout the sector. The catalysts for overall improvement have been the significant rise in yield per acre and increased acreage from multiple-cropping. This, in turn, was made possible by the introduction of a new cost-reducing technology package, which included HYVs, fertilizer, improved management practices, and some irrigation. The new management has seen wheat planted following the harvest of aus and aman rice so that residual soil moisture can be utilized. When needed, much of the wheat also has access to supplemental irrigation. The expansion of wheat production has been accompanied by declining average unit production costs which are the consequence of improved input/output relationships from combined elements of new technology. Furthermore, net returns to wheat under these conditions must be good since wheat competes with boro rice where irrigation is available and with pulses and oilseeds under nonirrigated conditions. The history of wheat expansion in Bangladesh is indicative of the developmental forces

TABLE 3.8
Growth in Average Wholesale Prices of Selected Agricultural Products, Bangladesh, 1973-81

Crop	Price (taka per maund) Average 1973	Average 1981	Index for 1981 (1973 - 100)	Annual Compound Growth[a]
				(%)
Onions	31	139	448	19.7
Tea	136	797	586	27.4
Pulses[b]	83	336	405	13.8
Sugarcane	4	15	375	14.8
Oilseeds[c]	110	324	295	10.0
Rice:				
Fine	87	208	239	9.3
Medium	82	194	237	8.9
Coarse	76	180	224	8.2
Potatoes[d]	49	108	220	6.2
Jute	53	102	192	11.3
Wheat	79[e]	110	139	7.9
Tobacco	482	462	96	(-1.6)
All food[f]	**176**	**545**	**310**	**12.3**

Sources: Ministry of Industries, and Bangladesh Tea Board; and Directorate of Agricultural Marketing, **Wholesale Prices of Agricultural and Animal Products in Bangladesh**, 1972-81.

[a]Estimated from least-squares trend line using annual data, 1973-81.
[b]Includes: masur, khesari, gran, and mung.
[c]Includes: mustard and groundnuts.
[d]Holland variety.
[e]1974 prices.
[f]From Table 1.16.

which can be marshalled to improve the agricultural sector. At the base is a revolution in yield improvements whose origin is found in modern technological and agricultural research.

If agriculture is to perform its vital role in fueling the developmental process, there must eventually be a decline in relative prices for more of the major agricultural comodities, and the terms of trade must be turned against the agricultural sector. The process is spawned by rising agricultural output

TABLE 3.9
Relative Wholesale Prices of Major Products, Bangladesh, 1973-81[a] (taka per maund)

Fiscal Year	Wholesale Price Index (All Products)	Rice[b]		Wheat		Jute		Potatoes		Tea	
		Current Price	Relative Price	Current Price	Relative Price	Current Price	Relative Price	Current Price	Relative Price	Current Price	Relative Price
1973	179	76	42	--	--	53	30	49	28	--	--
1974	250	100	40	79	32	53	21	90	36	136	54
1975	399	210	53	141	35	86	22	93	23	177	44
1976	359	125	35	77	21	90	25	92	26	330	92
1977	362	113	31	79	22	100	28	67	19	430	119
1978	408	138	34	91	23	140	34	73	18	708	174
1979	446	152	34	91	20	141	32	79	18	873	196
1980	502	201	40	116	23	114	23	93	19	852	170
1981	541	180	31	110	20	102	19	112	21	797	147
Compound rate of change in relative prices[c]	12.2	12.4	(-3.5)	2.4	(-6.3)	11.2	(-0.8)	4.9	(-6.3)	32.5	21.6

Sources: Ministry of Industries, and Bangladesh Tea Board; and World Bank, Report No. 3768-BD, March 3, 1982, pp. 270, 272-273, and 235.

[a]Deflated by wholesale price indices for all products in Bangladesh. 1970 = 100. Values taken from Table 1.16.
[b]Based on coarse rice price only.
[c]Calculated from least-squares trend line.

which increases the supply of these crops relative to demand, thus, causing prices to fall. If the process is grounded in improved production efficiency, then the basis exists for sustained growth throughout the economy.

The mere presence of declining relative prices is not sufficient in and of itself, however, to conclude that some of the preconditions of development are in place. Declining relative prices in most LDCs often result from governmental price policy which holds food prices artificially low in relation to normal market equilibria and to other prices in the economy, or to a policy which depresses normal market prices by bringing in large supplies of food to be distributed outside the market channels. This has been the history in Bangladesh. In such instances, declining relative prices are not the result of increased agricultural efficiency but come from misdirected public policies which actually retard general development. Where prices are held below normal market equilibrium, more food is demanded than can be supplied, food distribution problems are increased, and income distribution is likely worsened. When large supplies of food are imported from outside market channels, this dampens both market prices and producer incentives. Such interventions place an undue burden on agriculture by encouraging resource flows in opposition to market forces, thus, reducing incentives and contributing even more to the problem of insufficient agricultural growth.[11]

Livestock and Poultry Production

There is a serious lack of reliable statistical information on the livestock and poultry sectors in Bangladesh. Data on livestock come mostly from the agricultural censuses of 1960 and 1977. However, accuracy is still in doubt. The 1977 census is more correctly described as a large survey which covered about 500,000 agricultural and livestock holdings throughout the nation.[12] The 1960 estimates also required adjustments for known inadequacies, and estimating the nation's animal populations has been severely distorted by the destruction of animals during the cyclone of 1970 and the war in 1971.

The Role of Livestock

Livestock's role in the agricultural sector is secondary to crop production but is, nonetheless, crucial in at least one respect. The power furnished by animals is the most important source of nonhuman power in the sector since it delivers the needed energy for most of the heavy farmwork such as plowing, threshing, and road transport. Livestock and poultry are also sources of animal protein (eggs, meat, milk, etc.) as well as

cash income to producers both from the sale of these items plus the hides and skins. Cash also is generated from hire of livestock or from the sale of animal and poultry dung as a home energy source or for fertilizer. On the investment side, livestock and, to a lesser extent, poultry often serve as a depository or savings to hedge against future needs or possible calamaties.

There is very limited commercial production of livestock for food in Bangladesh. The major activities approaching this type of production are found on three governmental stations and one university research facility which sell cattle. The most important of these is located at Savar, near Dhaka, and was established in 1959. Two other cattle stations are located at Sylhet and at the Bangladesh Agricultural University at Mymensingh. The BDG also operates a buffalo farm at Tejgaon in Dhaka district. In total, about 3,250 cattle are housed on the stations.

In addition, the BDG manages several poultry farms and research and breeding facilities for goats, pigs, sheep, and ducks, which are in various stages of development. Additionally, six BDG-operated cattle breeding farms are being built or programmed.

The scarcity of land and the relatively high resource cost of animals as a protein source have essentially precluded the development of any type of livestock sector which produces animals solely for food. Draft animals are sold for food after they are unable to work and female calves are often culled and slaughtered when not required for herd replacement. These two sources, along with imports of live animals from India, furnish most of the livestock supply for the fresh meat markets. Most slaughtering is done outside of licensed facilities, in villages, and in rural trading centers.

A deficient feed base is the most important constraint to livestock production in Bangladesh. Feed deficits are reportedly in the magnitude of 45 percent in terms of dry matter, 50 percent in terms of total digestible nutrients, and 80 percent in terms of digestible protein. Furthermore, Bangladesh's high cattle population gives a stock rate for cattle well above the average for most countries in the world. Only 0.487 acres of arable land and pasture per animal exist in Bangladesh as opposed to an average of 3.694 acres for all other nations.[13]

Inadequate forage is particularly critical for cattle and buffaloes which are used for farm power. There is only a limited production of fodder for use by draft animals, so, for the most part, the animal population subsists on rice straw and polishings, oilcake and pulse residues, sugarcane tops, and the meager amounts of grass which can be scavengered along roadsides, embankments, and around the homestead. The supply of food is more critical during the monsoon season when high waters cover portions of embankment areas and the small amounts of

supplemental feed are exhausted. The number of livestock maintained by each farmer is normally decided on the basis of anticipated draft power needs. The available feed is then rationed, which generally leads to an insufficiency of nutrients. The low energy levels available to draft animals as a result of the restricted feed base is reflected in their reduced capacity for sustained work. Work animals require complete rest every second or third day and, additionally, are frequently afflicted with disease and other health problems resulting from their poor nutrition.[14]

Poultry are widely held by farm families in the agricultural sector and, like animals, are not raised on a large commercial basis except in a few cases. Both ducks and chickens have relatively low production levels. Chickens lay an average of thirty-five to forty-five eggs per year, and ducks lay an average of seventy to seventy-five.[15] Losses to disease are high, as are those related to predators. Ducks are more adaptable than chickens to the natural environment of Bangladesh. Ducks produce more eggs and meat and are resistant to major diseases which create high death rates among chicken populations. The BDG has initiated several poultry improvement programs and raised improved breeds on their poultry farms which are distributed nationwide.

Livestock Numbers

Animal numbers, excepting goats, have remained fairly stable between 1960-77, which is consistent with the inability of the resource base to support dramatically expanded animal numbers (Table 3.10). Cattle increased about 8.2 percent between the years of the censuses. An estimated 20.5 million cattle were in Bangladesh in 1977.[16] They were about equally distributed as to sex. About one-third of the cows were reportedly used for work, which, if added to the male population, sets the potential supply of draft animals at around 13 million head.[17] The animals that were over three years of age amounted to 70 percent. Buffalo and sheep showed some increase in numbers, but the changes were small.

There are three main breeds of Zebu cattle in Bangladesh which constitute most of the total population. The stocks are genetically poor and small in stature. The animals suffer from poor diets, are poor meat and milk producers, and generally are infested with parasites. Calving rates are low, i.e., cows calve about once each two years. Mortality rates are estimated at 25 to 30 percent the first year due to nutritional stress, disease, and death caused by predators.

Veterinary care is not adequate to deal with the wide range of disease problems confronting the livestock industry. Attempts to improve the genetic base of the national cattle herd began in 1947 and has continued mainly in the form of limited governmental

TABLE 3.10
Comparison of Number of Livestock and Poultry, Bangladesh, 1960 and 1977

Type of Animal	1960 (number) (1000)	1977 (number) (1000)	% Change 1960-77
Cattle	18961	20509	8.2
Buffalo	455	469	3.1
Sheep	477	508	6.5
Goats	5660	8436	49.1
Chickens	20096	41465	106.3
Ducks[a]	--	12125	--

Source: Bureau of Statistics, **Report on the Agricultural Census of Bangladesh, 1977**, June 1981, p. 293.

[a]No data reported for 1960.

support to import improved breeding stock. Artificial insemination was introduced in 1965 and by June 1980, seventeen artificial insemination centers (AIC) with four to five bulls each had been established in all but three district headquarters. Additionally, eighty-four thana service subcenters are planned or are in the process of construction. From 1958-79, 560,000 inseminations were performed with a conception rate of about 40 percent. In 1980, an additional 200,000 were performed. The efforts to date, however, have reached only an estimated 4 to 5 percent of the total national herd.[18]

Goat numbers reportedly rose by 49 percent to an estimated 8.4 million in 1977. Such an increase seems unusually high where the land base does not have the capability to respond to sharply increased demands. Goats are scavengers and their food needs can be satisfied more easily than other animal types, which may partially explain such a dramatic increase. It also is conceivable that the 1960 census was understated.

The chicken population doubled to an estimated 41.5 million in 1977 (Table 3.10). Such a rise is consistent with the proportional increase in households occurring during the period. Barnyard type chickens also are scavengers and require very little supplemental feed to survive and produce minimal meat and eggs. Chickens sold in the markets of Bangladesh are characteristically small and average around two and one-half

pounds. Ducks totalled 12.1 million in 1977, but no data were reported for 1960.

The livestock and poultry populations were, for the most part, distributed quite equally among geographic regions (Table 3.11). Rajshahi tends to have a larger proportion of livestock than the other divisions. An estimated 29 percent of the cattle were in this region. Khulna, with 23 percent, had the least cattle. Poultry and ducks were quite evenly distributed. Chittagong had slightly higher levels of both poultry and duck populations than the other areas, but the differences were not significant.

Production of Livestock and Poultry Products

Official estimates of the quantity of animal and poultry products produced are available only from 1975-78, but they should be viewed only as indicative due to the uncertain data base (Table 3.12). The production of chicken eggs grew at a 4.1 percent annual average rate, and duck egg production grew at a rate of 1.9 percent. Both fluid milk and beef production increased at the compound rate of 3.1 percent annually. The trends are consistent with rising animal numbers presented earlier.

Among the nonfood livestock and poultry products, dung, skin, and hides are the most important on the list which includes bones, wool, hair, feathers, and egg shells. A wide variety of artesan and industrial enterprises process livestock products.

Dung is an important source for both household energy and farm fertilizer. About 50 percent of the estimated 20 million tons (dry) of livestock and buffalo dung produced annually is used as fertilizer. About 35 percent is used for household energy. Of the remaining that is collected, a good portion is used for homestead plastering and wall construction (the mixture of dung with clay and urine produces an insect resistant plaster for home use).[19]

Skin and hides are produced primarily from cattle, buffalo, goats, and sheep, plus a variety of snakes and other wildlife. Estimates place goatskin production at about 5.7 million annually, cattle and buffalo at 2.3 million skins, and sheep at around 200,000. Most skins are chrome-tanned (a very low level of processing technology) for export. The World Bank reports that less than 20 percent of the production is processed into leather products for local consumption.[20] Skin and hide exports are the third most valuable source of foreign exchange earnings in Bangladesh.

The processing industry consists of 170 tanneries, of which 70 are reportedly small-scale cottage industrial types. Most are located in the traditional tanning center of Hazaribagh near Dhaka. Of the remainder, the majority are in the Chittagong area. Only about ten factories have finishing equipment. There

TABLE 3.11
Number of Livestock and Poultry by Division, Bangladesh, 1977
(1000 head)

Division	Cattle	Buffalo	Goats	Sheep	Chickens	Ducks
Dhaka	5452	37	1890	106	10685	2357
Rajshahi	5998	149	3467	232	10596	2659
Khulna	4340	178	1818	66	8334	3436
Chittagong	4719	105	1261	104	11850	3674
Total	**20509**	**469**	**8436**	**508**	**41465**	**12125**

Source: Bureau of Statistics, **Report on the Agricultural Census of Bangladesh, 1977,** June 1981, p. 293.

are sixty-two organized footwear producers in Bangladesh and reportedly 12,500 small cottage industries which produce leather and plastic footwear, belts, and purses.[21] The organized portion of the system experienced a high degree of BDG intervention following the war when thirty-one abandoned tanneries were taken over by the public sector. However, only one still remains in the public sector as all others have been returned to private control.

The fundamental problem in any attempt to expand hide and skin processing in Bangladesh is the limited supply of raw product and its poor quality. Skins are a by-product of animals mostly disposed from use as farm animals or from wild animals and snakes. The supply is irregular and low. Yet, the current availability of hides and skins appear to be sufficient to support a sizeable processing effort. The primary constraints are inadequate equipment, technical knowledge of current finishing technologies, and the low quality of hides delivered for processing. An estimated 30 percent of the hides arriving at tanneries are sunburned or decomposed, and many have been cut.[22] Finally, the marketing system lacks a meaningful grading standard or price incentive structure to encourage quality production.

Discussion of production trends and potentials for livestock and poultry products, however, has limited meaning in the context of Bangladesh's agriculture. Livestock products are merely the by-products of maintaining the livestock (milk and cheese) or of the salvage phase of disposing of them when they can no longer do farmwork (meat and hides). As long as foodgrain for human consumption is in short supply, there will be limits on the

TABLE 3.12
Production of Livestock and Poultry, Bangladesh, 1975-78

Products	Units of Production	Fiscal Year 1975	1976	1977	1978
Milk & Milk Products:					
Fluid milk	1000 maunds	13289	13429	13977	14547
Uhee	"	453	456	475	495
Butter	"	20	20	21	22
Chana	"	532	537	559	582
Curd	"	531	537	559	582
Cheese	"	33	34	35	36
Meat:					
Beef	"	4490	4533	4720	4915
Mutton	"	1119	1130	1204	1283
Chicken	"	1551	1586	1654	1725
Edible Offal:					
Cattle & buffalo	Pieces	2971	3000	3123	3251
Goat	"	5731	5793	6169	6569
Sheep	"	237	239	250	262
Head & Trotts:					
Cattle & buffalo	1000 number	2971	3000	3123	3251
Goat & sheep	"	5968	6032	6419	6830
Animal Fat:					
Cattle	1000 maunds	72.62	73.37	76.25	73.25
Buffalo	"	3.40	3.40	3.60	3.80
Goat & sheep	"	14.92	15.10	16.04	17.04
Hides & Skins:					
Cattle	1000 number	6419	3666	3815	3968
Buffalo	"	112	114	121	128
Goat	"	6419	6414	6909	7441
Sheep	"	294	297	310	323
Eggs:					
Fowl	"	721901	729619	769738	812700
Duck	"	506100	539700	539700	539700

Source: Bangladesh Bureau of Statistics.

response capability of the sector to yield a growing supply of livestock products.

The case differs, to some extent, for poultry which are grown for cash to be generated from the sale of eggs, milk, and meat and which involve minor maintenance or production costs. Individual household expansion is possible even within the existing resource constraints. Furthermore, commercial production, while still limited, has the potential for expansion once input availability, particularly coarse grains like corn, become less of a constraint.

Traditional Inputs

The agricultural sector is characterized by small farms utilizing traditional production inputs principally in the cultivation of rice. Capital goods throughout the sector are generally limited to simple tools (Table 3.13). The most common are sickles, spades, ploughs, and weed hooks. For those living near the rivers, small boats are a common capital investment. Some forms of capital are produced essentially from native materials and labor. Most land preparation and some phases of harvesting utilize animal power. Tractors or other forms of mechanized power are very limited. Irrigation is the one exception which employs mechanical power extensively for pumping water.

Labor intensity characterizes all phases of the agricultural production process. Most of the labor is supplied by the family household and is the most important input in the agricultural production system. Management is likewise provided by the household. Both family and farming decisions are intertwined.

Traditional methods symbolize the practices and techniques employed in the sector. Irrigation is not widely practiced, but, where it is, delivery often relies on traditional delivery systems. "Dhoons," a rocking hollow log configuration, and "swing baskets," a two-man basket arrangement, are used extensively to draw water from irrigation sources.

Organic manure is widely used in areas where fertilizer is applied, but chemical fertilizer usage is increasing rapidly. The limited supply of dung and the improved domestic production of urea are principal reasons for the change.

Seeds are generally saved from one year's production to be sown the following season. There is only limited processing or screening of the seed stock. Germination rates vary due to inadequate storage of seed supplies. Management of the production process gives minimal attention to regulation of disease or insects unless the incidence of damage rises to significant levels. Likewise, control of birds and rats is not

TABLE 3.13
Traditional Agricultural Implements on Bangladesh Farms, 1977

	Number Reported	Farm Holdings Reporting	
		Ownership	Use
	(in 1000s)		
Ploughs	7272	5387	6100
Ladders[a]	5724	5252	6038
Spades	7025	5490	5916
Sickles	12218	6001	6118
Hand sprayers	130	121	433
Hand hoe combings	2864	2676	3198
Khurpis[b]	1960	1302	1369
Weeding hooks	8342	4246	4353
Boats	745	684	776
Dhoons[c]	950	815	980
Bullock carts	57	564	689
Sugarcane crushers	21	21	68
Others	163	96	106

Sources: Bureau of Statistics, **Agricultural Census 1977**; and World Bank, Report No. 3309-BD, February 23, 1981, p. 137.

Note: The total number of farm holdings was 6852558; of these, 595385 were reporting livestock but no landholdings.

[a]For breaking land pieces in seedbed preparation.
[b]Short-handled hoe.
[c]Traditional irrigation device.

widespread despite the fact that both can inflict significant harm to crops.

Application of production inputs utilizes traditional methods. Fertilizer application, seeding and transplanting, weeding, and harvesting are all manually accomplished for most crops. Application of insecticides and herbicides utilize handsprayers, but the incidence of use is low.

In general, the sector is dominated by traditional technologies. However, there has been movement towards more modern production systems in the last decade. Included are:

(1) greatly increased use of commercial fertilizers where restoration and maintenance of fertility has become more economic given the intensity of land use and the absence of other alternatives; (2) some tendency to partially mechanize has occurred on larger farms; (3) some of the more highly specialized crops such as tobacco and tea, where export standards require the adoption of new methods in order to remain competitive; (4) the adoption of HYVs which have generated high yields, particularly for wheat and boro rice; and (5) the use of modern irrigation technologies which have been found to be economically feasible when applied to several crops, especially in with HYVs and fertilizer.

Modern Inputs

Commercial Fertilizer

Among the modern inputs, adoption of commercial fertilizers has been significant. The nation's agricultural production depends heavily on fertilizer applications. Other means of restoring fertility, such as fallow or rotations using perennial crops, are not good alternatives where land is so scarce and under such high-use intensity. Part of the high acceptance rate for fertilizer is related to the BDG's program emphasis which has recognized this dependence. Commercial fertilizer has been furnished at subsidized prices and an elaborate system of warehouses (godowns) has been developed to facilitate the storage and distribution processes. Priority also has been given to local production of commercial fertilizer to utilize domestic supplies of natural gas. In 1981, three domestic plants produced 416,144 metric tons of fertilizer, mostly urea. They are located at Chittagong, Ghorasal, and Fenchuganj.[23] Domestic production currently accounts for approximately 50 percent of the nation's fertilizer needs.

When the new plant under construction at Ashuganj is at full capacity (planned for 1983), Bangladesh will meet its projected demand for urea. Two new urea plants to be built at Chittagong will provide some exportable surplus through 1990 if all plants can consistently produce at near their rated capacity.

Growth in chemical fertilizer use has been constantly upward since 1973 (Table 3.14). The only exception was a 26 percent decline in 1975, attributed to an explosion at the Ghorasal plant which reduced the availability of locally produced urea and a widespread flood which reduced demand for fertilizer. The distribution index in 1982 was at 216 in relation to 1973. The annual trend growth for the period averaged 12.9 percent. The largest distribution was an estimated 874,639 tons in 1981. Usage in 1982 decreased to a point slightly below that of 1980,

TABLE 3.14
Distribution of Commercial Fertilizer by Weight, FY 1973-81 (long tons of bulk weight)

Division/District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Rajshahi	**66550**	**78997**	**68379**	**104830**	**131423**	**189572**	**195435**	**234782**	**264095**	**252137**
Dinajpur	13626	14113	14149	20281	24198	35267	35774	43507	45138	40849
Rangpur	13637	16555	14442	21533	27309	38203	41787	43515	55638	50589
Bogra	14206	19293	15865	24382	33682	42772	47428	58251	70133	71095
Rajshahi	13588	17435	15792	21136	27556	41753	41327	57682	58683	56184
Pabna	11493	11601	8131	17498	18678	31577	29119	31827	34503	33420
Khulna	**54156**	**53790**	**36779**	**63192**	**66524**	**106917**	**100874**	**131918**	**130056**	**115604**
Kushtia	10599	9631	8227	14281	21356	31053	28254	43652	42651	37083
Jessore	7954	10635	9198	15291	20928	31068	32839	41272	40551	39593
Khulna	6483	7375	4201	6864	7577	11890	9545	12210	16556	15016
Barisal	23475	20987	12216	20923	13222	25117	22702	25766	24130	20002
Patuakhali	5645	5162	2957	5833	3441	7789	7534	9018	6168	4910
Dhaka	**110974**	**105544**	**66633**	**129750**	**138585**	**192826**	**202632**	**212481**	**237461**	**236517**
Mymensingh[a]	48963	49604	33218	59457	59118	91889	91308	95646	107099	95585
Tangail	9165	9835	5805	14661	16002	22511	27454	29291	35129	37652
Dhaka	45800	39589	23871	50192	54692	65710	69287	69777	80759	87583
Faridpur	7046	6516	3739	5440	8773	12716	14583	17767	14474	15697
Chittagong	**152343**	**141553**	**107758**	**159813**	**179525**	**226059**	**242667**	**258929**	**243027**	**224065**
Sylhet	20858	12772	14634	15511	16082	23512	20202	27440	26406	25751
Comilla	51460	52610	36063	62261	69091	98790	115292	127250	119795	111213
Noakhali	19967	21605	15434	24867	27375	32763	31078	36931	32682	28960
Chittagong	58236	51977	39086	54487	64446	68335	73087	63802	59523	53114
Chittagong Hill Tracts	1822	2589	2541	2687	2531	2659	3008	3506	4621	5027
Total	**384023**	**379884**	**279569**	**457586**	**516057**	**715374**	**741608**	**838110**	**874639**	**829323**

Sources: World Bank, Report No. 3768-BD, March 3, 1982, p. 214 for 1973-81 figures; and Bangladesh Agricultural Development Corporation, "Monthly Fertilizer Newsletter," June 1982 for 1982 figures.

[a]Including Jamalpur, which was a subdivision of Mymensingh until December 31, 1978.

but the sales for the first six months of 1983 are ahead of 1982. During the past three years, fertilizer prices have been increased about 78 percent from Tk. 81 per maund in 1979 to Tk. 144 per maund in 1982 (composite price for all fertilizer types). Also rainfall has been very limited which has discouraged fertilizer use. The fact that usage has been sustained is significant in the face of considerable price increases, although there are other extenuating factors.[24]

There is substantial seasonal variation in the use of fertilizer (Figure 1). The highest purchases normally are in the months of September, October, and November for use on wheat, boro rice, and vegetables. Some of the September purchases also are applied to transplanted aman rice about two weeks before flowering. The other period of high purchases is the months of February and March when fertilizer is used mainly on boro rice. Fertilizer sales are lowest in June and July. There is a slight upward trend in fertilizer use in each of the peak months over the last five years. Of particular interest was the September 1982 sales which were at about the same level as 1981. There had been concern that higher prices of fertilizer had sharply curtailed usage as reflected in lower July and August 1982 purchases compared to earlier years. However, these low purchases seem to be more related to weather as sales rebounded in September. In fact, the total offtake from August through December 1982 is slightly ahead of the same months in 1981.

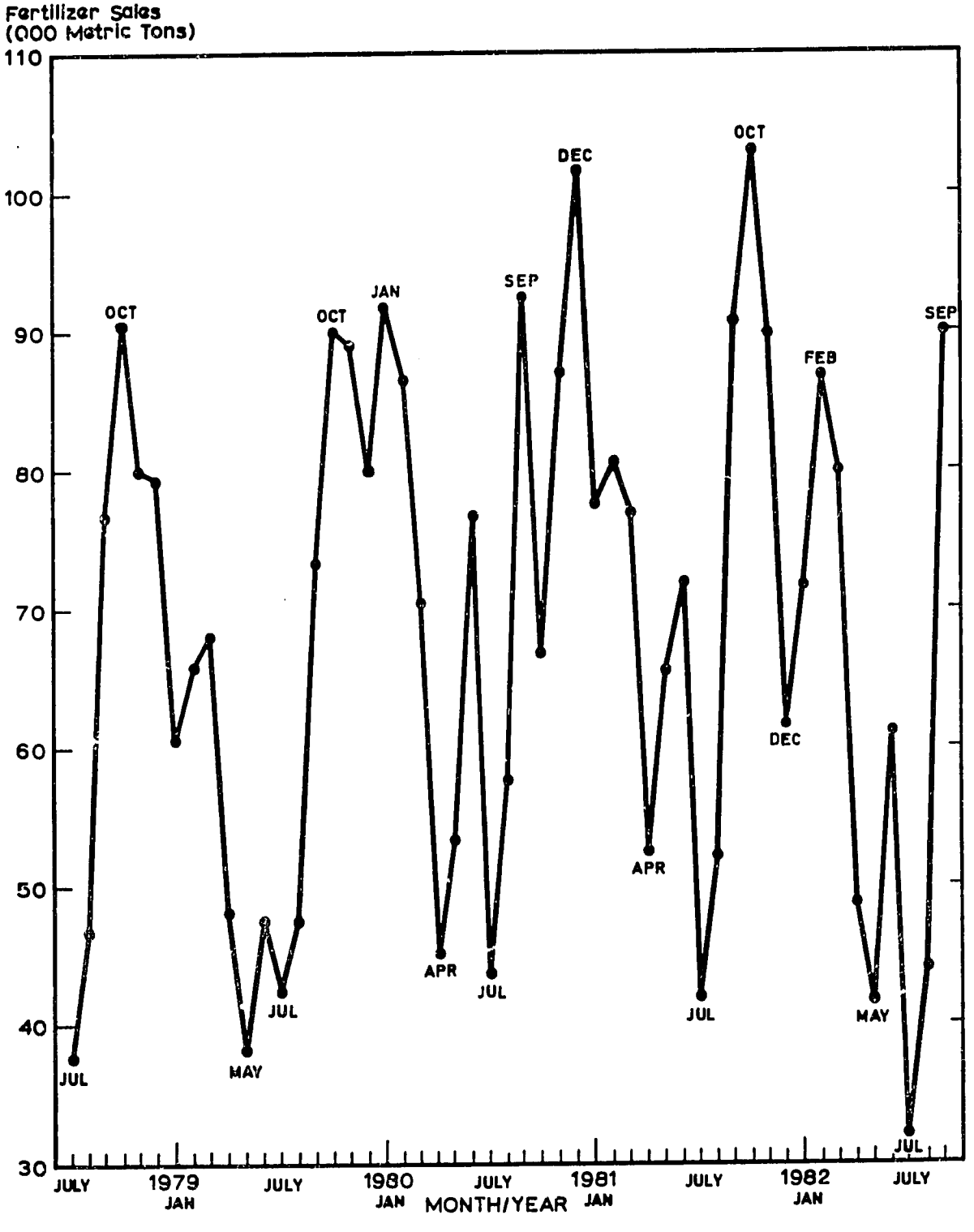
Fertilizer usage tends to be quite evenly distributed geographically, but there are slightly higher applications in Chittagong and Rajshahi divisions. Comilla district is consistently the highest regional user. This may be due to the historic role the district has played in agricultural demonstration. Even before independence, Comilla district was used as a "showplace" for introducing new programs and technologies in agriculture as the farmers there tend to be more progressive.

Chemical fertilizers involve three major nutrients, nitrogen, phosphorus, and potash. The application of nitrogen constitutes about 65 percent of the total. Phosphorus represents around 25 percent.[25]

Fertilizer adoption is fairly widespread among producers of most crops. The 1978 Land Occupancy Survey found that about two-thirds of those producing cereal crops in Bangladesh used chemical fertilizers. Specifically, the results showed that 69 percent of wheat growers, and 68 percent of boro, 62 percent of aus, and 61 percent of aman rice producers applied fertilizer. Among jute producers, 56 percent used chemical fertilizers.[26]

These percentages for cereal producers were essentially confirmed by the Fertilizer Equity Study conducted in 1979 (Table 3.15).[27] Furthermore, the study shows that farmers are adopting chemical fertilizers on a wide variety of crops. In addition to the cereal crops, more than 50 percent of the plots reported in

Figure 1. Monthly Fertilizer Sales, Bangladesh, 1979-1982



Source: USAID Food and Agriculture Office.

TABLE 3.15
Use of Fertilizer in Production of Selected Crops, Bangladesh, 1981 (percentage of plots)

Crop	Type of Fertilizer			
	Chemical	Manure	Compost	Ashes
Tobacco	83.0	19.1	0	8.5
Wheat	78.3	31.8	16.0	10.1
Boro	61.0	5.8	15.7	1.1
Vegetable	71.0	16.1	35.5	22.6
Aman[a]	58.1	40.2	1.8	9.3
Aus[a]	51.0	53.7	14.7	4.1
Potato	38.4	60.8	8.8	32.8
Chili	67.4	24.7	20.2	20.2
Oilseeds	31.4	23.5	4.5	1.6
Spices	23.8	6.3	4.8	4.2
Pulses	3.5	2.5	1.7	7.2

Sources: International Fertilizer Development Center, **Agricultural Production, Fertilizer Use, and Equity Considerations--Results and Analysis of Farm Survey Data, 1979/80, Bangladesh,** Muscle Shoals, Alabama, December 1981; and Bangladesh Agricultural Research Council & International Fertilizer Development Center, **Statistical Summary of Farm Survey Data for 1980/81 Boro Crop Season, Bangladesh,** May 1982.

[a]1980 estimates.

the Equity Study had fertilizer applied to produce tobacco, vegetables, potatoes, and chilies. Furthermore, barnyard manure was extensively used on all crops, especially potatoes, vegetables, aus rice, chilies, and wheat. Ashes are less often used but were, nonetheless, applied on a significant number of plots for vegetables, potatoes, and chilies. Compost was used sparingly.

The amount of fertilizer applied varies among the three major rice crops, most likely in respose to the security of water supply (Table 3.16). Boro producers who used fertilizer applied an average of 1.77 maunds (146 pounds) per acre. Applications to aman and aus rice were about equal, 1.26 and 1.23 maunds per acre, respectively. Boro producers in Bogra, Chittagong, Tangail, and Barisal applied the highest average amounts. Bogra producers used 286 pounds of fertilizer per acre. Among aus

TABLE 3.16
Use of Fertilizer for Rice Production by Geographic Region

Seasons	Boro 1980[b]		Aus 1980		Aman 1980	
District	% Using Fertilizer	Average Level of Use[a]	% Using Fertilizer	Average Level of Use[a]	% Using Fertilizer	Average Level of Use[a]
Dhaka	77.6	1.35	72.9	0.62	79.1	0.92
Faridpur	14.8	1.08	36.9	0.41	0.9	0.00
Mymensingh	94.0	1.11	98.3	0.55	96.6	1.01
Tangail	100.0	2.73	84.6	0.89	89.3	1.21
Chittagong	94.7	3.40	78.9	3.19	65.0	1.23
Comilla	82.0	2.39	84.9	2.12	38.4	1.35
Noakhali	50.6	0.97	100.0	1.46	99.1	1.37
Sylhet	11.7	0.85	4.5	0.89	17.9	0.56
Khulna	59.0	0.93	34.5	1.19	81.9	1.75
Barisal	41.5	2.65	2.2	1.82	7.3	0.27
Kushtia	68.4	1.65	80.7	2.65	86.7	2.75
Jessore	70.0	1.57	53.8	0.59	81.0	1.01
Rangpur	79.6	1.07	43.1	0.46	73.4	0.67
Bogra	100.0	3.47	99.1	1.50	99.1	1.14
Dinajpur	84.3	0.83	30.3	0.30	20.7	0.14
Pabna	72.1	1.46	55.2	0.94	81.0	1.25
Average	68.0	1.77	61.6	1.23	63.7	1.26

Source: Bangladesh Agricultural Research Council and Internatioal Fertilizer Development Center, **Agricultural Production, Fertilizer Use, and Equity Considerations—Results and Analysis of Farm Survey Data, 1979/80**, Bangladesh, December 1981, p. 43.

[a]Maunds per acre, 1 maund = 82.29 pounds.
[b]Fiscal year = July 1979 to June 1980.

producers, those in Chittagong, Comilla, and Kushtia used the most. The heaviest use among aman producers was in Kushtia and Khulna. The regional variation probably is explained mainly by uncertainty in the stability of water supplies, with the higher use regions having more irrigation and more reliable rainfall. The higher rates of fertilizer applied to boro rice clearly is indicative of a stable water supply as supplemental irrigtion has become more widespread.

Statistics are not available on the recommendation for optimum ferlizer application in various districts. But the high interdistrict variation in average use is of some concern. Admittedly, soil fertility is variable among regions in Bangladesh. The shifting rivers deposit soils of various classes and fertility in many areas which could account for some of this observed variation in fertilizer use. Yet, Bangladesh does not have good regionally specific soil fertility evaluations to provide detailed soiled analyses and information to farmers. To the extent that fertilizer recommendations are made, they come from the research institutions which generally prescribe average

amounts for a given district, and these do not necessarily meet the individual needs of farmers. The present system, with its lack of formal soil fertility assessment, and an operational but limited research capability has not produced the requisite data The inadequacy of fertilizer recommendations also may contribute to the downward pressures on usage. Risk is increased when recommendations are unrefined and farming is hetrogeneous, particularly if fertilizer prices rise.

The largest percentage of fertilizer users (73.2 percent), and the highest levels of fertilizer application (1.74 maunds per acre) were found among those paying cash rental. Both demonstrate an economically consistent result. As might be expected, cash renters view rental payments as a fixed investment for the year and, therefore, attempt to maximize their returns to the fixed factor by applying the optimal amounts of variable input (fertilizer) to accomplish this goal. On share-cropped land, 61.4 percent of the operators applied 0.86 maunds per acre. Only 58.8 percent of the owners applied fertilizer at the rate of 0.89 maunds/acre.[28]

The number using fertilizer tends to rise as farm size increases, but the relationship is not clearly demonstrated by the available data. The percentage of users fluctuates from 61 percent to 63 percent to 69 percent as farm size increases to two and one-half, five, and over five acres. But, about 65 percent of the farmers with less than one acre use fertilizer. However, smaller farmers apply fertilizr more intensively.[29]

The adoption of fertilizer is one of the bright spots in the struggle of Bangladesh's agriculture and serves as a demonstration of the potential responsiveness of the entire sector. Bangladesh is using fertilizer at a rate of about 50 percent above the median for the region.[30] Still, much remains to be done to improve overall usage. The fact that average yields, especially of rice, have not shown greater gains in the face of growing fertilizer use is of considerable concern, as is the limited crop mix which now makes extensive use of fertilizer. The singular use of fertilizer as one modern input will not elicit the potential response without the addition of complementary input factors, especially water. Single vector technologies seldom prove viable.

Irrigation

Bangladesh is blessed with an abundance of water resources. The major river systems which flow through the nation plus the high levels of rainfall add up to a significant water availability. However, the flat alluvial topography and the shifting of river courses and bank areas are not conducive to water conservation, storage, or flow regulation. Therefore, development and use of water resources, particularly for agriculture, rely heavily, but not exclusively, on groundwater

supplies. Surface water is utilized but primarily with low-lift pumps which do not normally involve widespread construction of permanent structures. Canal development is an exception. Studies of groundwater availabilities indicate a general sufficiency to meet the nation's projected needs, although there are growing uncertainties,[31] especially those related to the functioning of the groundwater system and the rate of recharge.

Irrigation development is a necessary if not a sufficient condition for agricultural development in Bangladesh. Its central importance to the BDG is exemplified by its emphasis on program development since independence. Four major programs have been initiated to encourage power pump irrigation and expanded water use. These include low-lift pumps, shallow tubewells, deep tubewells, and handpumps. All have been under the direction of the Bangladesh Agricultural Development Council (BADC) and most have been highly subsidized. The recent BDG movement towards greater private sector participation includes these programs. The programs' trends since 1973 reflect the strong influence of this earlier BDG intervention and BADC control and the more recent policy toward privatization, which should be completed for all programs by 1984.

Program Trends

Total acreage under irrigation has risen consistently since 1973 (Table 3.17). In 1981, 4.1 million acres were under some form of irrigation. This represents only 13 percent of the 32 million acres of multiple-cropped land in production. Of the total lands being irrigated, 58.4 percent utilized modern technologies. This level of modern input use continues a steady upward trend from 1973. In that year, only 44.5 percent of the irrigation applied in Bangladesh used modern means. Most of the increase in irrigated acreage has resulted from adoption of new technologies. For the most part, traditional methods rely on surface water availability which is not subject to dramatic change over time. Since 1973, acreage under traditioal methods has grown at an annual compound rate of only 0.1 percent, while acreage serviced by modern methods has increased by 6.2 percent. Use of dhoons is the most popular traditional technology.

Low-lift pumps dominate the use of the modern means. However, the trend in tubewell drillings has been substantially higher.

Overall, the rising trend in irrigated acreage has been moderate. For the nine-year period, about 1.1 million new acres have come under irrigation. In 1977, there was a substantial and unexplained reduction in acreage, but this recovered in 1978. In general, around 100,000 additional acres per year are being brought under irrigation, although in 1982 it is estimated that 300,000 new acres were added. Overall total irrigated acreage has grown 3.2 percent annually since 1973.

TABLE 3.17
Acreage Irrigated by Different Methods, 1973-81 (1000 acres)

Method of Irrigation	1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual Compound[a] Growth Rate (%)
Modern Methods	**1322**	**1604**	**1740**	**1707**	**1557**	**1804**	**1959**	**2224**	**2363**	**6.2**
Tubewells	93	131	234	263	234	314	396	446	548	22.2
Low-lift pumps	1165	1408	1442	1363	1232	1370	1434	1536	1645	2.8
BWDB gravity schemes	64	65	64	81	91	120	129	242	171	17.5
Traditional Methods	**1671**	**1598**	**1821**	**1750**	**1446**	**1785**	**1703**	**1649**	**1687**	**0.3**
Swing-baskets	97	101	116	143	162	154	172	181	205	9.8
Dhoons	921	851	955	968	728	980	962	977	912	0.7
Canals	172	229	208	148	174	177	117	60	201	(-7.0)
Other	481	417	542	491	382	474	452	430	369	(-2.3)
Total Net	**2993**	**3202**	**3561**	**3457**	**3003**	**3589**	**3662**	**3873**	**4050**	**3.2**
Of which:										
Modern (%)	44.5	50.1	48.9	49.4	51.8	50.3	43.5	57.4	58.4	
Traditional (%)	55.5	49.9	51.1	50.6	48.2	49.7	46.5	42.6	41.6	

Sources: World Bank, Report No. 3768-BD, March 3, 1982, p. 237; and Bangladesh Bureau of Statistics and Bangladesh Water Development Board for 1981 data.

[a]Estimated by least-squares trend line.

The trend in low-lift pump (LLP) usage and acreage under irrigation has been upward, but the rate of change has been moderate (Table 3.18). In 1982, 37,826 pumps were fielded. This was an increase of almost 15 percent over the number placed in 1973. The command area per pump was thirty-four acres, which was slightly less than prior years. The highest command areas have been in Kushtia district with fifty-eight acres per pump in 1980. About 1.3 million acres were irrigated by LLPs in 1982.[32]

The number of deep tubewells (DTWs) has increased almost tenfold since 1973 (Table 3.18). In 1982, 11,486 wells were in operation which irrigated an estimated 758,000 acres. The highest concentration of tubewells was in Dhaka district with 1,483 in operation. Large numbers also were operating in Mymensingh, Tangail, and Rangpur. The command area per pump was sixty-six acres which was the highest to date. Mymensingh had the largest acreage under irrigation from deep tubewells.[33]

The trend in shallow tubewells (STWs) has shown the most significant rise, and during the last two years the increase has been dramatic (Table 3.18). In 1980, 10,664 STWs were in operation covering about 128,000 acres. Since 1980, the number has risen fourfold to 42,955 which were irrigating 515,000 acres in 1982. The command area per pump continued at about twelve acres nationwide.[34]

The distribution of handpumps is a relatively new activity, and a long history of sales is yet unavailable. As of June 1982, however, an estimated 130,000 handpumps had been sold.[35]

Irrigation is applied to most major crops in Bangladesh, but the acreages are low and vary considerably (Table 3.19). Cereals occupied 89 percent of the irrigated acreage in 1981. Boro rice was the highest single irrigated crop with 61 percent of the total irrigated acreage. Wheat was the second most important with 12 percent. Aman and aus rice had only 9 percent and 7 percent, respectively. Among the noncereal crops, potatoes occupied 4 percent of the irrigated acres. Irrigation of other crops was not significant by comparison. The general upward trend in irrigated acreage has been shared unequally by the major crops. Wheat acreage has shown the most dramatic change, increasing at an annual compounded rate of 46.5 percent since 1973. Aus rice acreage has risen 9.1 percent annually, and aman has risen 2 percent. Irrigated acreage for boro rose only 0.6 percent annually since 1973 but on a much higher base acreage than for other rice crops. The absolute number of new acres of boro under irrigation was about equal to the combined total of the other rice crops. Potato acreage increased at a respectable 7.4 percent annually.

The trends in adoption of new irrigation technology are encouraging. The dramatic growth in STWs in very recent years may be indicative of the potentials which exist for developing water resources and the adoption of pumping technologies. Notwithstanding the positive trends, some issues remain. First, the

TABLE 3.18
Trend in Low-Lift Pump, Deep Tubewell, and Shallow Tubewell Irrigation by BADC, 1973-82

	Type of Irrigation			Command Area					
				Low-Lift Pump		Deep Tubewell		Shallow Tubewell	
Year	Low-Lift Pump	Deep Tube-well	Shallow Tubewell	Per Pump (acres)	Total (1000 acres)	Per Pump (acres)	Total (1000 acres)	Per Pump (acres)	Total (1000 acres)
1973	32917	1237	994	37	1218	31	38	4	4
1974	35243	1494	998	38	1339	41	61	4	4
1975	35516	2699	1029	37	1314	44	119	7	7
1976	36382	3828	2162	36	1310	40	153	6	13
1977	28361	4461	3045	39	1106	37	165	6	18
1978	36730	7453	6447	37	1359	45	335	9	58
1979	35895	9329	8374	40	1436	54	504	11	92
1980	37389	9795	10664	40	1496	59	578	12	128
1981	36060	10131	26735	38	1370	63	638	12	321
1982	37826	11486	42955	34	1286	66	758	12	515

Sources: Bangladesh Agricultural Development Corporation; and USAID/Dhaka, Food and Agriculture Division.

contraception use prevalency among Bangladeshis from the present level of about 18 percent to around 60 percent. This will be a

TABLE 3.19
Area Irrigated for Major Crops, Bangladesh, 1973-81 (in 1000 acres)

Crops	Fiscal Year 1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual Compound Growth[a] (%)
										(%)
Aus	108	172	178	182	189	211	228	227	276	9.1
Aman	255	294	275	208	208	208	241	318	347	2.0
Boro	2221	2362	2700	2618	2023	2515	2437	2942	2467	0.6
Wheat	34	34	45	125	179	232	352	426	481	46.5
Other cereals	11	10	10	6	6	4	4	8	11	(-4.7)
Pulses	12	4	5	4	3	2	2	3	11	(-6.0)[b]
Oilseeds	7	4	4	4	10	8	9	8	12	11.5
Potato	100	102	124	134	140	153	165	159	176	7.4
Vegetables	91	88	89	85	94	104	121	99	107	3.1
Sugarcane	15	17	17	19	22	25	23	24	24	6.5
Cotton	0.01	0.03	0.01	0.05	0.05	0.5	1	3	4	127.4
Other crops	140	123	113	90	135	137	111	110	113	(-1.3)
Total	**2994**	**3211**	**3560**	**3475**	**3009**	**3600**	**3694**	**3877**	**4049**	**3.2**

Sources: Bangladesh Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh,** December 1978, pp. 44-46 for 1973 and 1974 data; and Bangladesh Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh,** December 1981, p. 40 for 1975-80 data.

[a]Estimated by least-squares trend line.
[b]The growth for 1974-81 was 2.5 percent annually.

adoption of irrigation technology, whether traditional or modern, is still low. The acreage under irrigation is, as yet, insufficient to underwrite the increase in cropping intensity and productivity which are needed to create a highly productive agriculture. Expanding irrigation is a keystone to this effort.

Secondly, current irrigation usage is strongly oriented to cereals production (especially boro rice). While increased rice production is needed and must be encouraged, the basis for broader water use needs to be demonstrated and accepted. Adoption of irrigation must go beyond rice if accelerated modernization is to be achieved in the agricultural sector.

Third, the most apparent criticism of the water development program is the dominance of larger farms as beneficiaries, particularly with respect to DTWs. Larger farms seem to have greater success in obtaining pumps. Often deep wells are placed on larger farms to the exclusion of more strategic locations which would better serve the intended command land area. Dominance of the water group by larger owners often restricts the accessibility of smaller landowners to irrigation water. In fact, the success and impact of current irrigation programs have been reduced considerably due to ineffective intra- and interfarm distribution of water. Actual command areas are considerably less than what is potentially available[36] as pumps and wells are used at less than capacity, especially deep tubewells.

Fourth, the efficiency of pumps has been constrained by inadequate maintenance and fuel supply policies of BADC. Insufficient and untimely availability of fuel and repair parts have increased the "down time" for many units.[37] Maintenance services, which are available only through BADC, have proven inadequate. Allegedly, these services are not always equally available for small holders. With the privatization of the distribution of equipment and services which began in late 1982, this problem may be of less importance in the future.

Finally, the subsidy philosophy, which pervades so much of the BDG policy stance toward agriculture, has dominated the provision of irrigation technologies. Progress towards full cost pricing finally has been made in recent years. Until the full cost pricing policy is fully implemented, markets will remain distorted and real economic values will not be determined accurately. It is significant in this respect that the new irrigation technology which has experienced the highest rate of adoption, shallow tubewells, is also the first one to be free of BDG subsidies. Without subsidy, the incentives for the most efficient use of water are established and the economic base for long-run development of the resource is put in place.

Improved Seeds

The production and sale of high yielding varieties (HYVs) also has been the responsibility of BADC, while BRRI and BARC are

responsible for their introduction. To date, the introduction of HYVs has been primarily for rice, wheat, potatoes, and very limited amounts of oilseeds and pulses. Some HYV seeds are imported for selected vegetables and a limited amount for corn, but the amounts are minimal and procurement is handled by the private sector.

For those crops handled by BADC, the HYV seeds for all rice crops are produced locally as are portions for wheat. The remaining wheat and all foundation potato seeds are imported.

BADC has established an extensive network to provide locally produced HYV seeds. Initial multiplication of cereal seeds is accomplished on twenty BADC farms located in diverse sections of the country. The farms range from 100 to 3,000 acres and total 5,025 cultivable acres. Seeds are then mass-produced under contract with a large number of individual farmers. The mass-produced seeds are cleaned, treated, and certified at BADC processing centers at nine different locations. The storage capacity at the seed processing centers is about 12,000 tons.[38]

The distribution of HYV rice seed by BADC has shown a definite decline since 1973 (Table 3.20). In 1982, only 51,867 maunds of HYV rice seed were distributed as opposed to 443,550 in 1973. The reduction is not due to a decrease in use of HYV rice by Bangladeshi farmers but because individual growers save their own seed after the initial planting and do not require annual replacements from seed provided by BADC. It is estimated that 97 percent of the HYV rice seed planted each year is from the grower's own stock.

Wheat seed distribution has shown a marked increase, especially since 1979. During both 1980 and 1981, BADC distributed in excess of 375,000 maunds of HYV wheat seed, but the amounts were reduced in 1982. Distributions increased almost eightfold between 1977-81 in response to the dramatic rise in HYV wheat production. Wheat producers reportedly utilize about 80 percent of their own production for subsequent planting.[39]

Distribution of improved potatoes has also risen, especially in recent years, as production has returned to levels approximating those attained prior to 1977. About 93,000 maunds of improved seed potatoes were distributed in 1982, which was about 7,000 maunds less than distributed in 1980.

The acreages being seeded to HYVs have expanded significantly since 1973 (Table 3.21). Total rice acreage utilizing HYVs increased from 2.6 million acres in 1973 to 5.4 million in 1981, with significant increments for all rice crops. In 1981, 64.4 percent of the 2.9 million acres in boro production was seeded to HYVs. For aman and aus only 15.9 percent and 15.6 percent, respectively, were in improved varieties. However, there were more total acres of HYVs in aman rice than in boro, and the acreage of aman and aus in HYV was almost double the HYV acreage of boro. Aus acreage in HYVs grew at a 22.6 percent annual rate between 1973-81 while aman and boro rose at only 4.9 percent and

TABLE 3.20
Improved Seeds Distributed by BADC for Selected Crops, Bangladesh, 1973-81 (maunds)

Year	Aus	Aman	Boro	Wheat	Potato[a]
1973	18028	378597	46925	27992	118220
1974	23229	159007	38916	38569	73067
1975	7259	50018	34597	18086	87834
1976	14467	28906	10253	124993	115770
1977	6190	16726	4623	47749	52036
1978	7107	15676	19457	93524	64614
1979	16221	12348	6904	130403	74364
1980	8102	30594	15952	375782	99425
1981	8953	12702	12121	379057	89010
1982	10940	18520	22407	296745	92868

Sources: Bangladesh Agricultural Development Corporation, Seed Distribution Division, **Statistics on Distribution of Improved Seeds, 1962-1981**; and personal interview with the Manager, Seed Distribution, BADC.

[a]Clones, not true seed.

4.7 percent per year, respectively. The aus growth is derived from a much lower initial base acreage, however.

One explanation for the difference in the acreage utilizing HYVs among the three classes of rice arises from agronomic and other risk factors. First, aus production is the highest risk rice crop produced in Bangladesh. Rain variability is high during critical periods for aus, which reduces the willingness of producers to make the additional investments in fertilizer and irrigation required to complement the use of HYV seed. Secondly, the production of HYV aman varieties can disrupt the rotation cycle and cause the producer to lose or forego either a preceding crop or a subsequent crop which is feasible where non-HYV aman is used. The reason is that HYVs require a fixed time for vegetation as opposed to local varieties which are photosensitive. Local transplanted aman can be planted at the age of one to three months and will always flower in mid-October. If HYV transplanted aman is used, the fixed vegetative cycle can cause the harvest period to overlap with the planting of wheat or boro rice. Furthermore, if the HYV transplanted aman is not planted on time, the thermosensitive character of the variety will lead to reduced yields if cold nights occur during

TABLE 3.21
Acres Seeded to Improved Varieties for Selected Crops, Bangladesh, 1973-81 (1000 acres)

Year	Aman[a]	Aus[a]	Boro[a]	Wheat	Potatoes
1973	1379	164	1088	53	--
1974	2043	329	1454	43	--
1975	1239	699	1629	82	--
1976	1375	872	1587	218	--
1977	1046	901	1338	288	--
1978	1232	980	1586	287	--
1979	1695	1054	1649	583	102
1980	2154	994	1789	1015	96
1981	2376	1200	1848	1412	127
Total 1981 acres[b]	14910	7690	2870	1460	250
Acres in HYV 1981 (%)[b]	15.9	15.6	64.4	96.7	50.8
Compound annual growth rate (%)[c]	4.9	22.6	4.7	56.3	11.6

Source: Bangladesh Bureau of Statistics, Agricultural Statistics Wing.

[a]Includes Paijam variety.
[b]From Table 3.4.
[c]Calculated from least-squares trend line.

flowering. If planting occurs early, the timing can compete with the aus harvest, especially in years when aus is planted late due to moisture deficiencies. None of these problems are encountered with HYV boro.

Wheat acreage in HYV totalled 1.4 million acres in 1981; this is in contrast to the 53,000 acres planted in 1973. An estimated 96.7 percent of all wheat acreage in 1981 was seeded to the improved varieties. The annual compound growth rate since 1973 has been 56.3 percent.

Data on potato acreage is available only since 1979, but the trend of HYV use has been upward. In 1981, about 51 percent of the acreage was planted to the improved varieties, mostly from Holland and India. The three-year growth rate was 11.6 percent annually.

Pesticides

Of the four major improved inputs of significance to agricultural development in Bangladesh, farm chemicals have received the least attention from BDG programs, despite the fact that insects, diseases, and pests (birds and rats) can cause extensive crop damage.[40] Use of pesticides, herbicides, and similar farm chemicals is not widespread in the sector and, with few exceptions, is not incorporated into the production sequence as a regular management practice. Applications most often are made when infestations become significant and are well advanced. Levels of chemicals applied are often less than recommended for effective control.

For the most part, pesticides are used in rice production. Some limited usage is found for wheat and mustard. In most cases, the use of pesticides is on HYV varieties. In 1979, a Ministry of Agriculture survey found that 93 percent of the growers treated boro HYV rice, while 48 percent and 47 percent of aus and aman producers, respectively, applied pesticides. Local rice varieties were treated by about 15 percent of the producers for aus and aman. Only 13 percent of the wheat producers used pesticides.[41]

Aside from rice, pesticide is most regularly used on tobacco and tea crops. Quality control is more demanding for these crops, particularly for that portion of production entering export markets. In recent years, increased pesticide use has been noted in mustard production. Some limited use also is found among potato producers using HYVs.

The record of distribution is mixed (Table 3.22). Most of the pesticides are used to control stem bore occurring in rice, jute, and sugarcane. In 1979, 75 percent of the total pesticide distributed was for bore control of the borer, principally in rice.

Experimental work, initiated in 1979 at BARI, has evolved to the point of pilot programs for the control of rats and birds.[42] Bait packets for rats have been developed which contain sufficient poison for an average field at a cost of two taka (about U.S. eight cents). Bird control is being tested with repellent-treated seeds. However, the programs have not reached the point of extensive commercialization.

Agricultural Energy

Most of the energy used in the agricultural sector is from human or animal sources. Some mechanization for irrigation has evolved which utilizes diesel and electrical energy. Additionally, energy resources are required in the home for cooking

TABLE 3.22
Distribution of Pesticides, Bangladesh, 1976-79 (1000 pounds)

Year	Borer Group	Pest Complex	Swarming/ Earcutting/ Caterpillar Group	D. Soil Treating Chemicals	Acari-cides	Fungi-cides	Rodent-icides	Weedi-cides	Total
1977	5705	761	156	107	6	178	10	46	696
1978	4182	963	265	39	--	445	18	32	5944
1979	2867	168	66	36	--	187	7	5	3336
1980[a]	3473	367	84	233	11	439	9	26	4642

Sources: Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, December 1978, p. 111, and June 1982, p. 42.

[a]Provisional.

and heating, and, in some cases, electricity is used for lighting where it is available.

The rural labor situation and its contribution to the sector's support of economic development has already been assessed in Chapter 2. Generally, the supply of rural labor was judged sufficient to meet the demands of agricultural production with some seasonal exceptions in selected regions of the country. Forecasts even suggest that projected increases in the number of rural workers will be substantially higher than the expected labor requirements of the sector. The problems of unemployment loom much stronger than the fear of insufficient labor. The issue of labor quality, particularly its stamina and productive potential, is related to questions of nutrition which cannot be addressed here in a meaningful way from the available data base. Sufficient to say, the human power required by the agricultural sector is seemingly available in adequate amounts to attend the needs of the sector, notwithstanding some seasonal shortages.

The status of availability of animal energy and draft power availability is considerably less optimistic. Overall, the availability of draft power in the sector could be considered adequate, based on the estimate of one pair of draft animals for each 3.7 acres.[43] It is generally assumed that one pair of animals can tend four to five acres. However, in Bangladesh younger animals and cows are commonly used for farm work, which reduces the real power availability.[44] On a horsepower basis, an average 0.16 hp per acre are available, which is about 20 percent below the recommended minimum. The situation varies geograhically. Noakhali district has the lowest availability (0.08 hp per acre) due in large part to the destruction of the herds via past natural disasters and the inability of the resource base to support restructuring of the animal capacity.

The animal power situation is even more unfavorable when viewed in terms of animal ownership. There are 37 percent of the farmers who reportedly own no animals while 10 percent own only one. The latter group must, therefore, share animals in order to get adequate power for most field operations. Slightly more than 50 percent of the farmers own adequate draft power. The inadequacy of animal power is most common among the smaller farmers who tend to own less animals and, even where ownership exists, are more inclined to utilize cows or overaged animals.[45]

The situation worsens when the seasonality of need is considered. The three seasonal peak periods for plowing in Bangladesh are from March 1 to April 10 (when an estimated 12 million areas require plowing), from about July 20 to August 20, and from about November 20 to December 10. The most severe shortage occurs in the March-April period. The World Bank estimates that to plow twelve million acres the recommended six times, each available draft animal would have to work forty-six days out of a forty-one-day peak season.[46] Obviously, this is an impossible circumstance.

Gill's recent study of farm power in Bangladesh demonstrates an interesting relationship between animal ownership and land area under cultivation. For the sample studied, the following relationships existed: those owning two bullocks farmed an average of 5.5 acres, with one bullock and one cow 4.4 acres were farmed, with two cows 3.3 acres were cultivated, and for those who owned no animals only 2.4 acres were in production.[47] Ownership of animals is related to the size of landholding since animals are costly and cannot always be economically justified for small acreages. The common practice of hiring out animals or doing custom work can improve the cost effectiveness of owning animals.

Tractor power is extremely limited in the agricultural sector. The farm power study estimated only 1.4 percent of the farms had tractor power, most of which is in the form of tillers. For the most part, these are likely remnants of the imports undertaken prior to 1970 by the Pakistan Farm Mechanization Committee. Reportedly, about 5,700 tractors and tillers were brought into Bangladesh under that program.[48] No significant imports have occurred since the war.

Agricultural sector use of diesel and electrical energy for production is fairly limited. According to a 1976 estimate, agriculture used 6.7 million kwh of electricity primarily for irrigation, which was only 0.5 percent of the total national use. Diesel fuel accounted for 2.1 percent of total usage.[49] Energy consumption in agriculture has obviously grown since 1976; but even if the increase is by a factor of ten, the present-day amounts are still relatively small.

Data on use of various forms of energy for household consumption are not readily available. However, one estimate indicates that traditional fuel sources (including jute stick, dung, rice straw and hulls, and firewood) generate about 75 percent of the nation's total energy consumption. Cow dung, rice straw, and rice hulls are the most important sources. Surprisingly, fuel wood accounts for only 3 percent of national energy use.[50]

Bangladesh is among the world's lowest per capita consumers of energy. In 1979, only 43 kilograms per capita (coal equivalent) of energy were consumed.[51] An estimated 75 percent of this is provided from traditional domestic resources. Even so, in 1982 Bangladesh imported 1.8 million tons of crude petroleum and petroleum products, which used up about 87 percent of the earnings from exports.

It is clear that Bangladesh has been affected considerably by rising world petroleum prices. The drain on the economy is significant and will continue unless import substitutes are developed or sources of export earnings discovered to offset the high costs of imported energy.

Agriculture has not been a major contributor to the increased demand for petroleum. Diesel use has been low. But the future

could bring a radically altered scenario if extensive irrigation development occurs as needed. Diesel power seems to offer the most reasonable source for irrigation, at least for the present, since electrical power has not yet proven reliable and the extension of rural electrification does not move rapidly. Failure to meet this energy need could be a decided deterrent to agricultural expansion.

Within the sector, animal power is of greatest concern. Current levels are, at best, marginally adequate. Rising production intensity will obviously place pressure on the sector's capability to provide animal nutrition for increasing numbers of livestock. Again, without some supply response, animal power can become a bottleneck, and part of the supply response is contingent on available animal feed. The prospect is not encouraging. Use of HYVs reduces the output of straw in comparison to local varieties, and the total digestible nutrients of these straws also are reportedly lower. Furthermore, the use of herbicides can render normal weed supplies unusable for feed.[52] Finally, animal feed and cooking fuel are competitive uses for straw, which can restrict the livestock feed supply and constrain animal expansion as rising population brings greater demand for human use of straw.

In a labor surplus economy like Bangladesh, adoption of labor-saving mechanization is generally considered inefficient unless there are significant peak seasonal labor constraints. The recent farm power study failed to demonstrate significant relationships between tractor adoption and increased yields, cropping intensity, and improved timing in the performance of practices such as plowing. It did, however, demonstrate the substitutability of tractors and tillers for human labor. To quote the study's conclusion:

> . . . if we take into account the full costs to society of deploying and using tractors, there must be serious doubt whether substantial expansion of mechanization of this kind is desirable; on the other hand there is a strong case for applying considerable effort to the improvement of animal power, associated equipment, and techniques in the agriculture of Bangladesh.[53]

The issues of draft power go somewhat beyond those presented in the power study, which represents a traditional solution to the power problem via increased animal numbers and feed base. Certainly, augmenting animal availability can accompany the introduction of more productive crop technologies and the release of land for "other" production as current levels of basic food requirements are met with less cultivated land. But the possibilities for small-scale mechanization should not be overlooked. The critical issue is the cost-effectiveness of providing the needed power. If animal power is to be expanded,

it will of necessity compete for the limited land resources with food production, until such time as lands are "freed" by improved technologies for producing other crops. Even then, there are no guarantees that the newly available land will be devoted to support animal feeds instead of other types of human food crops. Comparative advantage will determine such allocations. But the greater the competition with food production, the higher the alternative costs of power produced from animals and the less likely animal power will be economically viable. Small-scale mechanization, on the other hand, will not necessarily create this competition for land. Its justification lies with the increased productivity from more timely land preparation that can potentially increase land-use intensity by lengthening the production season to include additional crops. The power study results may be inconclusive on this point due to differences in location and alternative cropping patterns which were not included in the study. Furthermore, the displacement of labor by small-scale mechanization at one level (land preparation) demonstrated by the study may be offset by increased labor-use intensity as cropping intensity is increased and acreages are extended. Certainly, the small-scale mechanization options should not be discarded with the present state of knowledge but rather are worthy of indepth analysis and research.

Finally, the issue of energy sources for home use continues and intensifies with population growth. Agricultural production may not be directly affected by changes in the availability of household energy sources, but indirectly the impact can be significant. The total question of energy for agriculture needs to be addressed early if agricultural expansion is to avoid curtailment caused by insufficient types and amounts of energy. Draft power should be a high priority consideration.

The Challenge to Bangladesh

The trends in food demand and agricultural output illustrate the basic parameters of the challenge facing agriculture in Bangladesh. Population will continue to rise, and with it the pressures for additional food (particularly foodgrains) will intensify. The critical issue is what these pressures will represent in terms of requisite increased food and whether the expected production levels within the reasonable response capability of the agricultural sector.

The manner in which one describes the present status of agriculture in Bangladesh can range from "moderate" or "emerging" to "dramatic in limited areas." What is being characterized by such statements is the fact that there are new initiatives in process in the sector, and trends are being set which were not

there in the early 1970s. Change is occurring, and the basis for growth is being established.

The output needed from agriculture is mostly a function of the growth in population.[54] Projections of population for Bangladesh are numerous. Those based on the attainment of replacement level fertility (RLF) (Figure 4 of Chapter 2) provide one of the more optimistic viewpoints of expected growth and places the population food equation for Bangladesh in the perspective of minimum changes which might be expected for both population and food output from agriculture. Based on the assumption that the RLF is reached by the years 2000, 2020, and 2040, alternative levels of population can be determined from the growth curves in Figure 4 for the years 1990 and 2000 (Table 3.23). The food availability is based on the 1980 domestic supply, and needs are calculated for each of the population estimates based on the targeted consumption proposed by the BDG. For foodgrains this is 15.5 ounces per capita daily. For nonfoodgrains it is the categories and quantities of food recommended by FAO to attain a daily caloric intake of 2,122. This caloric total has been adopted by the BDG as a planning base. Neither donor food assistance nor imports are included in the initial supply of foods, so the growth rates needed in the out-years are those which would bring Bangladesh to self-sufficiency.

The range in annual growth of foodgrains (mostly rice and wheat) needed by 1990 to meet rising demand due to population is from 4.0 percent to 4.4 percent (Table 3.23). By the year 2000, the required growth in cereals ranges from 2.8 to 3.5 percent annually. Increases of these magnitudes are clearly within sight of the 3.6 percent growth rates for foodgrains occurring since 1973. Still, to meet these requirements it will mean that annual output must likely rise somewhat above the growth trends to date.

The annual growth needed for other foods is generally higher than for grains. For 1990, the growth in all other food classes must range from about 16 to 24 percent annually. The exception is sugar, of which the growth must approximate that of foodgrains. Projected to the year 2000, the growth rates are reduced to an annual range of 8.7 to 12.8 percent. Pulses will require the most dramatic expansion, but the growth of fruits and vegetables and oils and fats also must be significant. Projected increases in the latter would eliminate current importations. While the growth rates needed for nonfoodgrains appear formidable, it should be kept in mind that, for the most part, these changes begin from an initial base which is considerably smaller than for cereal crops, and this makes higher percentage changes much more realistic.

On the less optimistic side, the population projections represent one of the most hopeful growth scenarios for Bangladesh and the lower limit of needed food output. Behind the attainment of replacement level fertility is the requirement to raise

TABLE 3.23
Projected Growth in Food Output Required for Self-Sufficiency in Bangladesh, 1980-1990/2000

			Food Requirements[a,b] (1000 mt)							Requisite Food Growth[e] (percentage)						
Population Projection[c]	Year	Population Million[d]	Food-grains	Pulses	Gur & Sugar	Milk	Meat	Fruits & Vegetables	Oils & Fats	Food-grains	Pulses	Gur & Sugar	Milk	Meat	Fruits & Vegetables	Oils & Fats
Base (avail.)	1980	87.5	11822	222	624	417	205	2147	87	--	--	--	--	--	--	--
Low	1990	111.0	17522	1838	918	2527	918	9877	457	4.0	23.6	3.9	19.7	16.1	16.5	18.0
	2000	131.0	20679	2169	1083	2982	1083	11657	542	2.8	12.0	2.8	10.3	8.7	8.8	9.6
Medium	1990	114.0	17995	1888	943	2595	943	10144	472	4.3	23.9	4.2	20.0	16.5	16.8	18.4
	2000	147.0	23205	2434	1216	3347	1216	13080	608	3.4	12.7	3.4	11.0	9.3	9.5	10.2
High	1990	115.0	18153	1904	951	2618	951	10233	476	4.4	24.0	4.3	20.2	16.6	16.9	18.5
	2000	150.0	23678	2484	1239	3415	1239	13347	620	3.5	12.8	3.5	11.1	9.4	9.6	10.3

Sources: **Statistical Yearbook of Bangladesh**, 1981; and World Bank, Report No. 2870-BD, March 21, 1980.

[a]Based on present BDG goal of 15.5 oz. per capita per day for foodgrains and the following FAO recommendations for nonfoodgrains: pulses--1.6 oz., sugar--0.8 oz., milk--2.2 oz., meat--0.8 oz., fruits & vegetables--8.6 oz., and oils & fats--0.4 oz. Fish & eggs are recommended at 0.6 soz. per day but production data were not available.

[b]Represents net domestic supply available in FY 1980 before donor assistance or imports are introduced. Using this as base assumes the shortfall between domestic supply and total requirements must be realized from domestic production and that present imports of food will be replaced.

[c]Low, medium, and high population estimates are based on the year replacement level fertilizer (RLF) will be achieved, i.e., two children per family (illustrated in FIGURE 4 of Chapter 2). Low level occurs if RLF is reached by the year 2000. Medium level occurs if RLF is reached by the year 2020. High level occurs if RLF is reached by the year 2040.

[d]Population estimates are interpreted from the three growth curves illustrated in FIGURE 4, Chapter 2.

[e]Exponential growth rates.

contraception use prevalency among Bangladeshis from the present level of about 18 percent to around 60 percent. This will be a formidable task.

Aside from the question of population control, the determination of food needs is a process which can involve a high degree of variability which renders the figures used here more subjective. In this example, we have utilized the basic assumptions of the BDG. Yet, there is strong evidence that their assumptions regarding foodgrain needs are entirely notional without a strong nutritional justification. Likewise, the total caloric values recommended by FAO have come under recent question since their assumed "standard man" is considerably larger and, thus, requires more energy than the average Bangladeshi. The overdistortion in caloric need could be 20 percent. These factors become even more contemplative when we consider that the definition of need for any individual food can be subject to a wide list of assumed foodgrain and nonfoodgrain options to meet the total caloric need. For example, if we assume 13.5 ounces of foodgrain daily instead of 15.5, Bangladesh would be self-sufficient, but the additional calories and nutrients would have to be obtained from other food sources with the obvious proviso that those nonfoodgrains be available.

Regardless of which scenario of food need is followed, there is an obvious requirement to augment production, and the changes should be more or less as suggested above. To do so will require a successful confrontation with the complex process of change over a wide spectrum of the agricultural structure. The monocultural tendencies of Bangladesh's agriculture have resisted significant change since independence, but they have yielded to progress in some crops such as wheat, potatoes, and rice. There are persuasive arguments for moving towards a more diversified crop base in Bangladesh if the nation is to achieve less risk from disease, drought, and other disasters which might substantially reduce production in a given year. Also, food diversity will deliver nutritional quality to the national diet which now is not being provided and will likely not be forthcoming with a singular developmental emphasis on foodgrains.

Growth in food production begins with the research base. Major breakthroughs in yield-increasing and cost-reducing technologies underpin the process. It is subsequently abetted by the extension of technical innovations, the availability of modern inputs, efficient product markets, incentives to farmers, and their education Success is closely tied to the public policy matrix, particularly those related to pricing in the product and factor markets, and the increased efficiency in program formulation and implementation to levels not heretofore attained.

The challenge to agriculture in Bangladesh is only symbolized by the maunds of rice, vegetables, and fruit which must be produced. The real challenge is to create the mix of technical talent, technical innovations, institutions, and enlightened

public policies which are supported by a popular will and sustained to at least the turn of the century.

It is a formidable challenge but not impossible.

Summary

The agricultural sector of Bangladesh is primarily a rice monoculture still characterized by reliance on traditional technologies although demonstrating an increasing rate of modernization. The sector is very vulnerable to weather fluctuations and lacks sufficient man-made control over critical agronomic variables, particularly with respect to water.

Rice production dominates the economy. Aside from rice, the most important crops in 1973 were jute, potatoes, oilseeds, sugarcane, and pulses. By 1981, wheat had made a dramatic increase to become the second most valuable crop after rice. Jute fell to fifth place due to the unfavorable world market situation. There were no other significant changes in the production milieu of the sector.

Rice production has shown a rise of 2.8 percent per year on average since 1973. The longer run increase since 1961 is about 1.7 percent annually. Of the three rice crops produced in Bangladesh, aman is the most important, accounting for about 57 percent of the total harvest. Boro rice has been the least important but has shown the highest annual production increases since 1961 and its 1982 output was only slightly less than aus. Wheat production has grown ninefold in the 1970s. Jute production has shown a general production decline. Among the other major crops, tea and potatoes have shown the most significant production improvements, although they are relatively minor crops.

The modest increase in output for the principal crops in Bangladesh is indicative of movement toward a more modern agricultural sector. Expansion in land-use intensity for agriculture has averaged about 1 percent annually since 1973. Three crops, wheat, potatoes, and boro rice, have shown significant increases in acreage, almost all of which is associated with multiple-cropping. Furthermore, rice, wheat, and tea have all shown improvements in yield. Rice yields in aman and aus continue to be low by world standards but grew at an annual average rate of 1.9 and 2.5 percent, respectively, since 1973. Yields for boro rice increased more slowly during the decade but were at considerably higher levels than for the other rice crops and approach world standards. Overall, the increases in production recorded in Bangladesh have come mostly from adoption of modern technology, enabling multiple-cropping and more intensive land use.

Modern practices predominate in the production of some crops. Commercial fertilizer is being used extensively on wheat, potatoes, transplanted aman, boro rice, tobacco, and mustard. Several other crops, including potatoes, vegetables, chilies, and spices benefit from traditional fertilizer. High yielding seed varieties have likewise been adopted extensively on wheat, boro rice, and potatoes. About 13 percent of the cultivated acreage is irrigated, and irrigation is increasing at an accelerated rate. About 58 percent of all irrigators now use modern techniques. The most popular technology has been the low-lift pump, but shallow tubewells are rapidly becoming relatively more important. Where practiced, however, irrigation is used mainly on boro rice. Wheat irrigation is also practiced but on a considerably lower acreage. There is evidence of continued technological adoption, however, as all of the major power pump programs have shown expansion. Shallow tubewell installations have increased fourfold since 1980 and 42,955 such wells were in use in 1982.

Livestock and poultry remain secondary to crop production. Animal numbers grew between the 1960 and 1977 censuses but at a very conservative rate. The slow growth reflects the restricted feed base which provides inadequate nutrition. Livestock are fed from various classes of crop residues, and poultry scavenge about the homestead. Livestock numbers are determined by farm power needs as there is very limited commercial type production. By-products from livestock and poultry contribute cash sources to the farm operation, but the amounts are a function of animal numbers which, in turn, are established by farm power needs.

Wholesale prices of agricultural products have risen considerably since 1973. Relative prices have fallen for the major crops except for tea. However, these declines likely are due more to policy interventions and nonmarket imports of foodgrains than to agricultural production increases (except possibly for wheat).

Most energy used in agriculture is supplied by humans and animals. Modern irrigation is the major exception. Agricultural labor is generally sufficient to meet the sector's needs except for some seasonal shortages. Animal power appears to be only marginally sufficient and could become a critical shortage if land use is intensified significantly. Expansion of livestock numbers will not be easily accomplished due to the inadequate feed base and the considerable obstacles that lie in the way of improvement. Farm power issues should be given priority consideration. Agriculture's use of petroleum-based energy is not yet extensive. However, if modern irrigation technology expands, diesel fuels are the most likely energy source to underwrite the increases especially until electrical energy becomes more available and reliable.

Footnotes

[1]Farmgate value is defined as wholesale price multiplied by the quantity produced or total revenue. It is not "value added" as is sometimes calculated by the Bureau of Statistics. All data throughout this Assessment are reported in fiscal years, unless otherwise indicated. For example, fiscal year 1973 is July 1972 to June 1973.

[2]Ziaul Huq and Charles H. Antholt, Analysis of Foodgrain Production Trends in Bangladesh, USAID Memo Report, Dhaka, January 1982.

[3]Huq and Antholt estimate these growth rates since 1947 at 8.4 percent for boro, 2.5 percent for aus, and 1 percent for aman.

[4]See Ahmed Raisuddin, Agricultural Price Policies Under Complex Socioeconomic and Natural Constraints: The Case of Bangladesh, International Food Policy Research Institute, October 1981.

[5]Cropping intensity is defined as: total crop area divided by land in production (excluding fallow land).

[6]The role of weather in determining yields in Bangladesh apart from new input factors should also be recognized. The extent to which yields in 1973-74 and 1981-82 were not equally influenced by weather can confound the analysis. If the weather in 1981-82 had a more positive influence than in 1973-74, the impacts attributed to modern practices will be overstated and vice versa for 1973-74.

[7]The distinction between changes in acreage and change in cropping pattern is as follows: The effect of acreage changes refers to the absolute change in acreage for a crop. The effect of change in cropping pattern is the change in the proportion of the crop in the total cropped acreage.

[8]This formulation is adjusted from that reported in: Carl E. Pray, "The Economics of Agricultural Research in Bangladesh," The Bangladesh Journal of Agricultural Economics II(2):1-34. (December 1979). Pray acknowledges the original formulation as the "Minhas- Vaidyanathan disaggregation techniques" (p. 2) but there is no reference to the original work. The formula presented by Pray estimates the aggregate impact for a list of crops. We

have revised his formulas to permit estimates for individual crops.

[9]Pray did this type of analysis, for 1964-67 to 1975-78, a set of crops which included the same list as analyzed here, minus tea and tobacco, by introducing prices to the analysis. In the aggregate, acreage contributed 52.1 percent to the total change and yield 45.7 percent. See, Pray, Economics of Research, p. 20.

[10]See Table 1.16.

[11]This issue is discussed elsewhere under the heading "Extraction of Resources in Absence of the Surplus." See: E. Boyd Wennergren and Morris D. Whitaker, The Status of Bolivian Agriculture (New York: Praeger Publishers, 1975) p. 9.

[12]World Bank, Bangladesh: Current Economic Situation and Review of the Second Plan, Report No. 3309-BD, September 29, 1981, p. 207. This same report contains a comprehensive analysis of the livestock and poultry sector. Much of the information for this section has been gleaned from the World Bank report.

[13]Ibid., pp. 272-4.

[14]Ibid., p. 219.

[15]Ibid., p. 212.

[16]The World Bank rates Bangladesh as twelfth in cattle population on a list of twenty-five nations. See: World Bank, Report 3309-BD, 1981, p. 273.

[17]Official estimates place the number at 10.3 to 10.9 million. See: G. J. Gill, Farm Power in Bangladesh, Development Study No. 9, University of Reading, Sept. 1981, p. 202.

[18]World Bank, Report No. 3309-BD, 1981, p. 211.

[19]Ibid., p. 251.

[20]Ibid, p. 253. These estimates are considerably below those shown in Table 3.12. We are inclined toward the World Bank estimates due to the methodological care used in making the estimates.

[21]Ibid., p. 254.

[22]Ibid., p. 257.

[23]Bangladesh Agricultural Development Corporation, Monthly News, July 15, 1981.

[24]The BDG also subsidizes rice prices. These were raised during this period to partially compensate for increased fertilizer prices. The issue of subsidies is more fully explored in the following chapter.

[25]Bureau of Statistics, Monthly Statistical Bulletin, Bangladesh, December 1981, p. 70.

[26]Bangladesh Bureau of Statistics, Land Occupancy Survey of Rural Bangladesh, December 1978. Table XIII.

[27]Interestingly, the percentages are almost equal. Either the samples are not compatible or there has been a minimal increase in the number of users between 1977 and 1979. Regardless, it appears that the number of users is significant and approximates at least the percentage quoted by the Land Occupancy Survey.

[28]Bangladesh Agricultural Research Council, Fertilizer Equity Study, pp. 38-41.

[29]Ibid., p. 38.

[30]International Agricultural Development Service, Agricultural Development Indicators, 1981, p. 13.

[31]For one example see: M. A. Matin, "Water Potential of Bangladesh," paper presented at Workshop on Water Management, Joydebpur, Dhaka, January 5, 1981.

[32]USAID, Project Paper--Agricultural Research Phase II, December 1980, Annex F, p. 14.

[33]Ibid., pp. 15-16.

[34]It should be noted that the statistics on shallow tube wells apply only to those placed by BADC. Wells developed by individuals are not included. No estimates are available, but the numbers are thought to be substantial.

[35]Information provdied by USAID/Dhaka, Food and Agriculture Office.

[36]For an appraisal of irrigation options in Bangladesh, see: Jack Keller et al., Irrigation Development Options and Investment Strategies for the 1980s, USAID Bangladesh Mimeo Report, Water

Management Synthesis Project, Utah State University, September 1980.

[37]The World Bank estimates that in 1979, only 74 percent of the 23,00 deep and shallow tubewells under BADC auspicies were in operation. World Bank, Bangladesh: Current Economic Position and Short-Term Outlook, Report No. 2870-BD, March 21, 1980, p. 28.

[38]USAID, Project Paper, pp. 3-9.

[39]The estimates for both rice and wheat were provided by Food and Agriculture Division, USAID, Dhaka.

[40]The importation of pesticides, fungicides and herbicides was assigned to the private sector in November 1979. An association named Pesticide Association of Bangladesh has been formed to facilitate the operation.

[41]Geoffery Swenson et al., Wheat Cultivation in Bangladesh, No. 81.1, BARI, June 1980; and Ministry of Agriculture, Cost and Returns Survey for Bangladesh, 1978-79 Crops Vol. I, III, and V, Dhaka, 1979-80.

[42]For an estimate of rat damage in wheat and a description of the control program see: Richard M. Poche' et al., "Rodent Damage and Burrowing Characteristics in Bangladesh Wheat Fields," Jorunal of Wildlife Management 46(1):130-147. 1981.

[43]Much of the information for this discussion is taken from Gill, Farm Power in Bangladesh.

[44]The impact on available power of a deteriorating composition of draft animals is confirmed by M. A. Jabbar, "Draft Power Shortage and Mechanization of Tillage in Bangladesh," The Bangladesh Journal of Agricultural Economics III (June 1980):

[45]A similar conclusion on the inadequacy of animal power in the agricultural sector was reached by the World Bank. See: World Bank, Current Economic Situation and Review of the Second Plan, Report No. 3309-BD, September 29, 1981, p. 221.

[46]Ibid., p. 21.

[47]Gill, Farm Power in Bangladesh, p. 185.

[48]Jabbar, "Draft Power Shortage," p. 7.

[49]Bureau of Statistics, 1980 Statistical Yearbook of Bangladesh, p. 548.

[50]USAID Project Paper, Bangladesh: Rural Sector Energy Project, December 1981.

[51]United Nations, World Statistics in Brief, New York, 1981, p. 6.

[52]Jabbar, "Draft Power Shortage," p. 2, footnote no. 7.

[53]Gill, Farm Power in Bangladesh, p. 212. Jabbar Draft Power Shortage, pp. 15-16 reports that a study by Roger Lawrence in 1970 came to essentially the same conclusion.

[54]Increases in per capita income and the maintenance of a surplus of production as security against catastrophy are also relevant demand determinants. However, due to data deficiencies, these two determines are excluded from the calculations which follow. However, neither are expected to be critically important to the estimates since a security stock is assumed to already exist in the base year and will not be affected and per capita incomes have been increasing only at moderate rates on average.

CHAPTER 4
THE AGRICULTURAL MARKETING SYSTEM

"No government that has 'abolished' markets has been successful in modernizing agriculture."

Theodore W. Schultz
Nobel Laureate in Economics
University of Chicago

Since man first traded salt for arrowheads, markets have been a crucial element in the process of development. When specialization in production occurs, the independence of the individual household is reduced. Exchange is necessary for existence, and each household must participate in a market situation to sell goods and services or to buy those of someone else. Technological adoption, likewise, relies on the forces of the marketplace. Before innovations become real alternatives to individual producers, the associated benefits and costs must be signaled. Markets provide suggestions of what is beneficial and what is not, and these indicators become inputs to decisions regarding the allocation of both individual and national resources.

The forces created by the market process, where buyers and sellers meet to exchange a good or service, are irrefutable and must be recognized, understood, and dealt with in developmental policies and strategies. Markets can be left free or they can be intervened by government. Traditionally, this decision is based on political preference and is usually a decision based on extremely limited knowledge of the reality and pervasiveness of the forces which comprise the marketplace.

Markets know no politics. As long as buyers and sellers exist, markets will operate both in a free market society or a controlled market society. The existence of the market is not at issue but rather the degree of intervention found appropriate by government and the effect of such interventions on resource allocation, production, and distribution. At whatever degree of intervention, market forces will continue to function and result in consequences which must be addressed. The existence of food surpluses, food deficits, and black markets (and smuggling) are all expressions of market response to types and gradients of governmental intervention and/or control. The challenge to governmental policy makers is to recognize the nature and importance

of these forces and to structure policies which channel them most effectively to desired developmental objectives.

The market embraces all of the activities involved in the flow of goods and services from physical production to ultimate consumption. It incorporates a wide variety of functions including, but not limited to, storage, transportation, processing, financing, grading, and risk-bearing. Of major importance to growth and development, however, is the exchange function.

Buying and selling is a critical and sometimes complicated system which, if not done efficiently, can inhibit economic progress. Imperfections oftimes lead to all sorts of distortions in resource allocation that can badly curtail the pace and effectiveness of society's development.[1] Traditionally, market institutions evolve into a composite of physical facilities related to market centers, organizational structures associated with various kinds and levels of markets, and rules and regulations designed by government to guide market operations within the context of national policies and priorities. The institutions also become a mixture of private and public sector inputs. The balance between the two is defined by the degree of public intervention found appropriate by national policy makers.

In a closely regulated society, many of the market functions are planned by the central government. At the other extreme of a laissez faire economy, all are provided by the private sector. Since the extremes are seldom found, it becomes a matter of national prerogative to arrange the allocation of marketing functions between the public and private sectors.

There are several areas where government, regardless of its political persuasions, has a strong comparative advantage in providing requisite market functions. These include: (1) insuring an efficient market exchange function free of monopoly or monopsony elements; (2) providing a network of price information for all segments of the market; (3) guaranteeing product quality and a standardized system of weights and measures; and (4) establishing an adequate system of transport and other communicative services. Specific conditions may dictate public provision of other market functions, but, in general, these four denote those that the private sector cannot effectively implement and, therefore, are best assumed by a governmental authority.

This chapter considers the structure and efficiency of the marketplace and its institutions as a vehicle in promoting developmental initiatives in Bangladesh. Particular attention is focused on the philosophy of the BDG as to the role of the private sector (and markets) in mobilizing resources. Additionally, agricultural factor and product markets are evaluated and the adequacy of BDG-provided marketing functions are considered. Public policies with respect to both inputs and production also are discussed. Finally, the nation's infrastructure of relevance to marketing is described.

The Philosophy of the BDG

The philosophy of the BDG towards market operation within the economy has undergone a considerable evolution since 1973. In large measure, the initial attitude toward markets per se arose from a broader philosophical issue concerned with private and public sector balance in matters of industrial development, control, and management. In the presence of extreme resource scarcity, the BDG was under considerable pressure to encourage and adopt an economic system which would permit the best utilization of scarce resources in the public interest. Inevitably, it seems, developing nations find more attraction and security in systems of greater control than those with less control, and the tendency has been towards more centralized management of the economy and its markets.[2] A central tenet of the philosophy is that the private sector conform to the nation's planned developmental objectives and that private interests adhere to the guidelines set forth by governmental managers.

Certainly this was the case with the Government of Bangladesh, particularly in the early period following independence. Centralized control was manifest in most areas of government, even to the point of considering (and rejecting) extensive management of the agricultural sector. One of the first acts of the government was to nationalize the major industries and the banking and insurance system. Also, a high level planning commission was established to guide the economic development of the country. The commission's initial output was a five-year developmental plan. The plan itself had limited, if any, provision for private sector initiatives in any part of the economy.

The restrictive impact of this early policy focus was soon recognized. In 1973, the government announced its desire to see the private sector participate in the nation's development and set forth a limited investment schedule which identified the areas and levels of private investment which would be allowed.[3] Initially, the limit on fixed capital investment for each private venture was set at Tk. 1.5 million, including land. This level was subsequently raised to Tk. 2.5 million, and by 1974 the allowable investment in private enterprises was increased to Tk. 30 million.[4] Even so, close controls remained on the private sector, and its development has proceeded slowly.

Viewed in retrospect, extensive changes are apparent. Currently, there is no limit on fixed capital investment in private ventures. Foreign investment in Bangladesh is being encouraged. A BDG-sponsored Export Fair in Dhaka (February 1982) and a Bangladesh Export Show in Los Angeles (April 1982) drew representatives from numerous nations seeking opportunities for trade relations with Bangladesh. Initiatives such as the "Wage Earners Scheme" (see Chapter 1) are a reflection of this orientation.

The Martial Law Government has made generation of private investment one of five major objectives of its administration[5] and has launched widespread initiatives to encourage the private sector, including disinvestment of many public corporations and enterprises. The economy is evolving into a mixture of centrally planned and private enterprise institutions. The most recent five-year plan (published in May 1980) calls for private initiatives and financial outlays of Tk. 50.4 million for private sector development:[6]

> The share of private sector in financial development outlay thus will rise from 11 percent in the First Plan, and 16 percent in the Two year plan to 22 percent in this Plan (1980-85). This escalation in private sector allocation, though mostly indicative, reflects the objectives and policies of the nation to increasingly associate the private sector in the process of economic development . . . It may be possible to have a large private sector in the economy provided the climate of economic development still improved with continued social and political stability in the country, engendering a sense of security and effectively effacing the post-independence uncertainties in the private sector . . . In particular, small entrepreneurship will be developed through research, extension, assistance with inputs and marketing facilities. Emphasis will be placed on developing a capital market through appropriate policy measures so that there can be a better mobilization of resources for productive enterprise, especially private resources flowing from abroad.[7]

Both the factor and product components of Bangladesh's market system reflect the tendency for a mixture of central interventions and free operation of market forces. In relation to agriculture, the role of both market forces and market functions are being recognized and distinguished. Those areas of particular governmental comparative advantage referred to above are being articulated as falling within the immediate realm of governmental responsibility and interest.[8] It is interesting to note that the BDG has increasingly recognized the role that markets and the private sector can play in mobilizing developmental resources and has made adjustments in its philosophy to permit these forces to be included in the overall developmental plan.

Still, the adjustment has not been total. Despite the apparent movement towards greater market and private sector reliance, the ever-present concern for food security has dominated public policy since independence. No group which has held control of the central government through these years has

been able to ignore the need, and rightly so, of assuring the food requirements of such a densely populated nation are being met. The tendency of the government has been to turn inward to more centralized control where paramount problems or crops of perceived high national interest are involved. The impartiality of the market mechanism has been distrusted as incapable of providing appropriate solutions.

The commitment to provide low-cost food has placed the BDG in the traditional and seldom escapable contradiction of many developing nations--low food prices to largely urban consumers will not elicit high production or technology adoption response from farmers. In the case of Bangladesh, the pressures to supply food at low prices are intense, given the precarious balance between yearly food supplies and requirements. There is no perceived margin for error or for policies which might produce the dreaded consequence of widespread starvation. The threat of natural disasters constantly haunts even the best devised food policies.

The policy mix, which has been adopted by the BDG, has not brought food self-sufficiency. Annual food deficits have persisted since independence. It is only because donor nations have had the sensitivity and capability to fill shortfalls that serious consequences have been avoided. Policies oriented toward food security have had a pervasive impact on the agricultural sector's capability to expand. Food production has lagged. But perhaps more damaging is the fact that agricultural developmental programs, which might fuel long-run growth, have often suffered in the face of short-term food security needs. Many of the deficiencies can be accounted for by the market interventions of the BDG (to some degree eased by the generosity of food donors) and the continuation of subsidies which have distorted price incentives and allowed associated resource misallocations. These gradients of intervention into the market system are apparent in the operation of the total system, and particularly so at some levels in both the factor and product markets.

The General Market System

The general system of product exchange in Bangladesh is of long standing. Time and governmental interventions have brought alterations to segments of the structure, but the age-tested basic system has generally persisted. Variations in marketing channels and specific functions are found for individual commodities, but, at the points of exchange, the system accommodates most classes of agricultural products within three main types of markets: (1) primary or village markets, (2) secondary or town markets, and (3) terminal markets.

Primary markets are the principal center of exchange for agricultural commodities in rural areas. These markets are the lifeline of rural Bangladesh and the vehicle through which most farm produce is exchanged. Primary village markets are held on regular days. There are an estimated 6,500 primary markets and an additional 2,000 smaller village markets (called "hats") which conduct small-scale trading.[9] The average geographic area serviced by a primary village market is twenty-five square miles. "Hats" generally service regions within a five-mile radius. Most villages in Bangladesh are served by a market which is within 2.5 miles. Storage facilities at these markets are nonexistent.

Secondary markets serve as wholesale outlets which operate as assembly centers for production regions and as distribution points in the consuming areas. Rural secondary markets generally develop on major river or railroad channels which readily access the nation's transport system. Town markets depend on water, road, and rail transport both to bring food into the marketplace and to use as a distribution mechanism to urban centers. Some 450 such markets are estimated to exist.[10]

Terminal markets are highly specialized and serve as the major contact point between rural and urban markets. Terminal markets collect and assemble products from both secondary and primary sources which are subsequently redistributed to urban outlets. Those operating at the terminal market level often act as commission agents in selling products brought by traders. In some cases, terminal markets also facilitate handling and distribution in the export trade.

Several classes of functionaries operate within the system to provide various levels of services which enhance the exchange process. The first level are farias and beparias, who are essentially itinerant merchants. The majority are seasonal traders. Aratdars function as wholesalers, and dalals operate as brokers or commission agents. Both perform a wide variety of functions ranging from short-term financing, to finding buyers for farias and beparias, to providing storage facilities for a fee. Aratdars are generally well-established in permanent facilities. They tend to be more important in the larger urban and semiurban secondary markets while dalals are most dominant in the smaller interior markets.[11] The institution of the aratdar is of long standing. Most come from families who have engaged in the business for decades. The working relationships which they have established with other traders throughout the marketing system have remained unusually stable. A high level of trust is placed in the aratdars, and the services they perform augment the exchange efficiency in the marketplace.[12]

All market traders are licensed by the government. Trader registration is maintained by commodity groups, but one trader may be licensed to conduct business in more than one commodity. In 1979-80, 50,844 faria/beparia were registered to trade in jute. Registration of dalals totalled 411 and for aratdars

336.[13] Additionally, a large number of smaller traders operate in local markets, particularly in the "hats," where control is less stringent than in secondary and terminal markets. The large number of faria/bepari virtually guarantee a high level of competition for the market functions they provide. Despite the registration requirement, there is no evidence that people are being restricted from entering this class of trading. On the other hand, less confidence exists at the level of the aratdars even though the numbers are extensive. The BDG has attempted to increase the freedom of entry and, thus, raise the number of licenses for this type of trader. To some extent, tradition has blocked this effort, mainly in the form of resistance from existing aratdars. Opposition may itself be telltale of some level of noncompetition. However, given the long-standing tradition of the aratdars and the high confidence levels and services they provide for both buyers and sellers, it appears unlikely they could have persisted for so long if collusion was extensive.

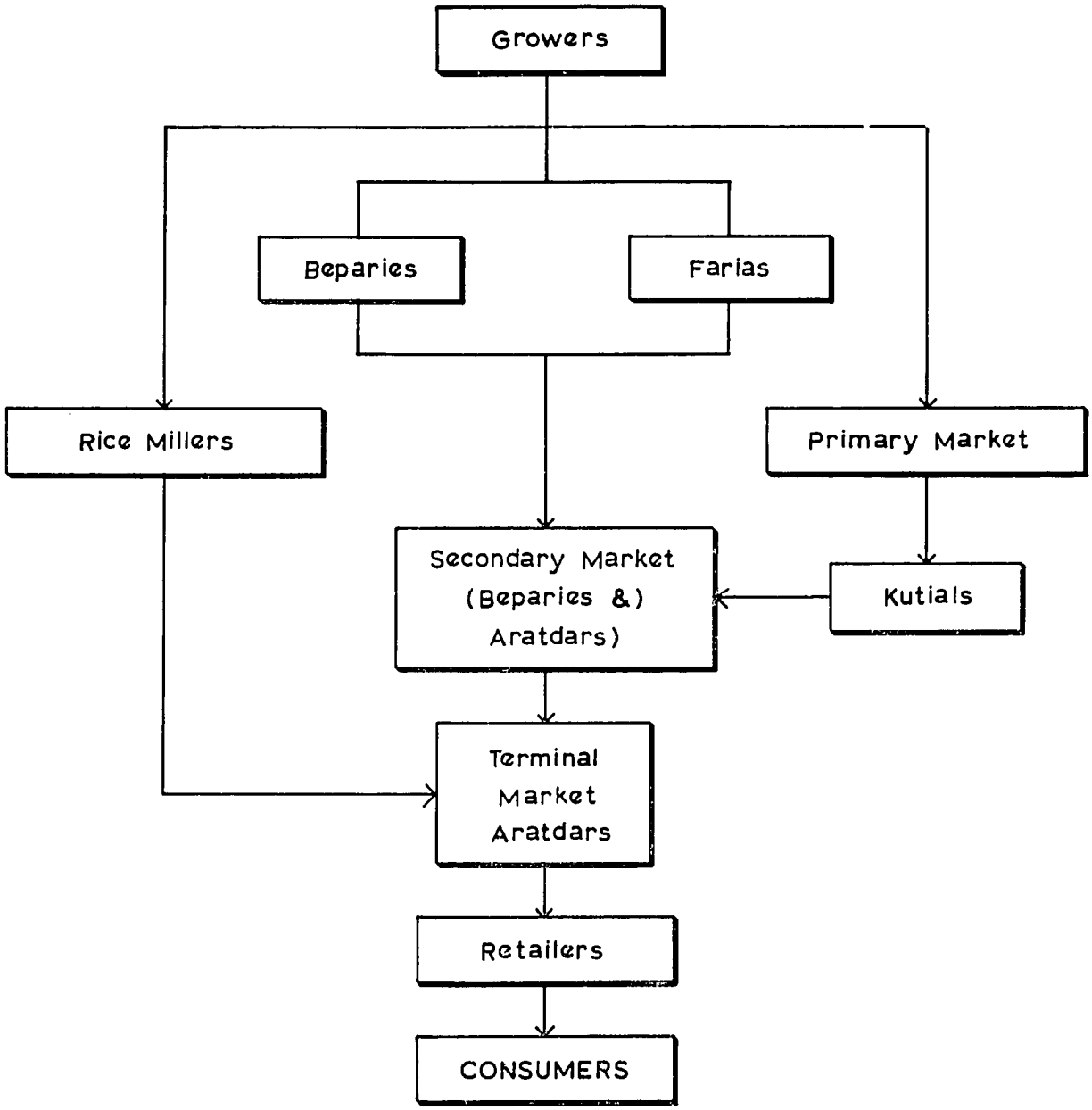
Additional classes of functionaries provide product processing services in the marketing system. Obviously, these vary depending upon the commodity. In rice marketing, for example, almost all rice entering the market is minimally processed, i.e., parboiled and husked (Figure 1). The parboiling is done primarily by kutials, who generally are landless or small landowners who buy paddy rice and do this first stage processing at home. Rice processing mills also do parboiling as part of an integrated process which includes rice husking and which is done almost totally by two types of mills. Village-oriented husking mills are most numerous, totalling an estimated 7,317 mills with an eight-hour capacity of 23,879 metric tons. Modern mills total 189 with a daily capacity of 3,195 metric tons.[14] Homepounding to remove the husk is still practiced, but the incidence is said to be decreasing.

Jute processing involves two stages. Kutcha bailers operate in secondary markets and do the first level of grading and loose assembledge. Pucca bailers are highly organized intermediates who process jute bales for export from kutcha bales or from loose bales.[15] In 1979, 2,460 kutcha balers and 181 pucca balers were registered with the BDG.[16]

Additionally, Bangladesh has several other important rural industries which offer processing type inputs to the general marketing system. Among them, oilseed processing, sugarcane (including gur production), tobacco, and fish drying are important activities. Artesan handicrafts using cane and bamboo, plus an extensive handloom cottage industry which produces items from factory spun yarn, also are important elements in the total marketing arrangements in Bangladesh. A recent census of only eleven thana counted 57,000 such rural enterprises.[17]

Here, too, there is little evidence that the services being offered at this level in the marketing system are not competitive. The large numbers of participants and the ease of entry

Figure 1. MARKETING CHANNELS OF RICE, BANGLADESH



Reference: Information taken from:

1) Report of Ahmed, Akhter U. "Rice Marketing in the Private Sector" Internal Memo USAID.

2) Farruk, M. O. The Structure and Performance of the Rice Marketing System in East Pakistan. Department of Agricultural Economics, Cornell University, USAID Prices Research Project, Occasional Paper No. 31, June, 1970.

are the main factors which argue for the presence of competition. This is especially true where cottage industries are involved as is the case with home processing of rice, oilseeds, gur, fish, and the handloom industry.

Product Markets

Product markets in Bangladesh are well-developed for most crops. The exchange of agricultural products is accomplished within the general structure already discussed with reasonable efficiency. Some variations are apparent, however, depending on the crop being marketed but principally in terms of the degree of governmental intervention.

Foodgrains

The distribution of foodgrains (rice and wheat) dominates the marketing system both in terms of the volume of product and the complexity of the overall market structure and policy matrix. Despite the fact that a large portion of the total foodgrain availability is consumed directly on farms, an estimated 20 percent of local production plus all imports enter the market system. This could approximate four million tons annually in recent years.

The current public foodgrain distribution system had its origin in 1943 as an aftermath of the extensive famine which was worsened by the British war strategy in India. Following the famine, the British (and later Pakistan) intervened on a large scale to rearrange the food distribution system. With these initiatives, governmental control of foodgrain prices, movement, procurement, and consumer rationing were established. Since that period, the government has assumed the role of custodian for foodgrains with a special concern for the urban populace. Despite considerable changes in the political composition of Bangladesh, the public foodgrain system has continued to survive with its lasting bias toward urban residents.[18]

The foodgrain marketing system is comprised of two subsystems: public distribution and market distribution. Foodgrains sold in the regular market are those quantities which are in excess of household consumption and not marketed through the internal procurement program of the BDG. People who are not entitled to purchase under the rationing system or who have needs in excess of the rationing entitlement, buy in the regular markets. The sources of supply for the public distribution program are internal procurement (purchase) by the government from growers and traders at preannounced prices and from imports (both donor gifts and international market purchases). The BDG has a monopoly on foodgrain imports.

The procurement prices established by the government serve as a minimum, guaranteed "floor" price to local producers.* They are free to choose between the BDG procurement price and the domestic market price. The supplies acquired by the government are used primarily to supply its obligations to ration cardholders at subsidized prices. More recently, however, these supplies have also been used to support "open market sales" of foodgrains as a means of reducing the level of market retail prices when demand or supply pressures push them above desired levels.

Because the domestic market price is generally higher than the procurement price, the amount of foodgrain purchased by the BDG from local producers tends to be low (Table 4.1). Since 1975, the quantity of domestic procurement has averaged only about 3 percent of total foodgrain produced in Bangladesh. Due to an unusually good aman rice harvest which created low market prices, 1981 proved to be an exception, and 7 percent of the total foodgrain crop was procurred. Of the foodgrain marketed through the rationing system between 1975 and 1982, only 24 percent was locally procured. Imports (mostly food aid) comprise a vast majority of the total foodgrain supplied to the rationing system, most of which is wheat. Imports traditionally run as high as 90 percent of the total foodgrain needed for the rationing system and to maintain BDG stockpiles. For domestically procured foodgrains, rice (mostly paddy) traditionally accounts for about 75 percent of the total purchases. Dinajpur and Rajshahi Districts are the largest suppliers of grains to the system.[19] These are also regions of traditional high rice production relative to demand where seasonal market prices may fall sufficiently to make the fixed procurement price the best alternative.

Foodgrains are distributed to Bangladeshis through the rationing system in seven categories:

(1) Statutory Rationing:	Those qualifying by reason of residence in the cities of Dhaka, Narayanganj, Chittagong, Khulna, Rajshahi, and Rangamati.
(2) Modified Rationing:	Those qualifying by reason of taxes paid to government. Priorities are in four classes (a, b, c, and d) with highest priority (a) to the poorest who pay no taxes.

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*Some donors have erroneously promoted the procurement pricing process as an incentive mechanism for rice and wheat producers.

TABLE 4.1
Availability, Disposition, and Stocks in the Public Foodgrain Distribution System, 1973-82 (1000 long tons)

	Fiscal Year									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Opening Stocks	274	297	214	749	823	376	591	209	779	1229
Domestic procurement	*	71	128	415	314	550	355	348	1017	299
Imports	2825	1667	2293	1493	779	1653	1146	2739	1061	1267
Total Availability	3099	2035	2635	2657	1916	2579	2092	3296	2857	2795
Statutory rationing	465	502	471	359	377	452	417	492	343	310
Priority categories[a]	350	396	554	584	551	753	754	907	601	658
Modified rationing	1592	777	578	496	288	353	312	385	179	484
Relief	207	52	161	110	33	30	45	57	50	71
Food-for-work	--	--	--	116	166	255	216	440	349	361
Marketing operations[b]	4	--	--	11	58	6	9	10	*	105
Open market sales[c]	--	--	--	--	--	--	43	111	*	41
Total Distribution	2618	1728	1764	1677	1473	1847	1796	2402	1522	2030
Losses	184	93	129	165	66	141	87	115	106	120
Exports & repayments in kind	--	--	--	--	--	--	--	--	--	20
Closing Stocks	297	214	749	823	376	591	209	779	1229	772

Sources: World Bank, Report No. 3768-BD, March 3, 1982, p. 279; and Food and Agriculture Division of USAID, for 1981-82 data.

* = less than 500 long tons.

[a] Includes: other essential priorities, large employers, and direct sales to flour mills.
[b] "Marketing operations" involve direct sale of grains to dealers at subsidized prices.
[c] OMS in paddy and rice were initiated during 1981/82 wheat OMS began in 1978/79.

(3) Essential Priority:	Those qualifying by reason of membership in the military forces (including the Bangladesh Rifles and Para Military), or who work for the police, hospitals (including patients), jails, or as fireman.
(4) Other Priority:	Those qualifying by reason of employment in other governmental offices, not in the six cities of statutory rationing, orphanages, universities, hostels, and primary and secondary school teachers.
(5) Large Firm Employees:	Those qualifying by reason of employment in factories employing fifty persons or more.
(6) Flour Mills:	All flour mills which qualify by registration with the BDG to receive wheat for processing.
(7) Relief:	Those qualifying by reason of recent natural disasters--not a regular source of food aid from rationing system.
(8) Food for Work:	Those receiving food as payment for work performed on approved work projects--not a regular source of food aid from the rationing system.

The rationing quota of foodgrain is unrelated to income. The quota allotted to individuals varies slightly for each of the rationing categories, but tends to be equivalent except for the "essential priority" cardholders (Table 4.2)[20]. Since 1973, the authorization has remained fairly constant at about 3 seers per capita per week (1 seer is equal to 2.057 pounds). In 1976-77, it rose to 4 seers per week and in 1981 was reduced to 2.5 seers and then to the current level of 2 seers. But the ratio of rice to wheat within the ration has changed, in part, depending on the kinds of foodgrains available from donor nations. In recent years, the trend has been towards a higher proportion of wheat as much of the food aid which supplied the system came from wheat-producing nations. Currently, wheat accounts for 1.5 of the 2 seers allocated, except for the essential priority category. The policy commitment to this level of allocation has been induced as part of the U.S. Title III program with Bangladesh.

The apparent equivalence of allotments is in reality rendered unequal by the frequency of disbursement assigned to the various rationing classifications. For example, a statutory rationing recipient can draw his ration weekly, but a modified ration is drawn only twice monthly. The inequality goes even further. For example, statutory rations are priority and allotments are forthcoming on schedule. On the other hand, modified rations are

TABLE 4.2
Foodgrain Quota for Different Categories of Ration System, 1973-81 (seer per capita except as otherwise noted)

Period		Type of Program			
		Statutory Ration[a]	Modified Ration[b]	Other Priority[c]	Large Employers[d]
Pre-Liberation to March 18, 1973	Rice	1.5	1.5	1.5	--
	Wheat	1.5	1.5	1.5	3 to 3.5
	Total	**3.0**	**3.0**	**3.0**	**3 to 3.5**
March 19, 1973 to Feb. 23, 1975	Rice	0.75	1.0	--	--
	Wheat	2.25	2.0	3.0	3 to 3.5
	Total	**3.0**	**3.0**	**3.0**	**3 to 3.5**
Feb. 24, 1975 to Sept. 5, 1975	Rice	1.25	1.25	1.5	--
	Wheat	1.25	1.25	1.5	35/family/month
	Total	**2.5**	**2.5**	**3.0**	**35/family/month**
Sept. 6, 1975 to Aug. 31, 1976	Rice	1.5	1.25	1.25	--
	Wheat	1.0	1.25	1.25	35/ " "
	Total	**2.5**	**2.5**	**2.5**	**35** " "
Sept. 1, 1976 to Oct. 15, 1976	Rice	2.0	1.5	1.0	--
	Wheat	1.0	1.5	2.0	35 " "
	Total	**3.0**	**3.0**	**3.0**	**35** " "
Oct. 16, 1976 to March 4, 1977	Rice	2.5	2.5	1.0	--
	Wheat	1.5	1.5	2.0	35 " "
	Total	**4.0**	**4.0**	**3.0**	**35** " "
March 5, 1977 to Dec. 2, 1977	Rice	2.0	2.0	1.0	--
	Wheat	1.0	1.0	2.0	35 " "
	Total	**3.0**	**3.0**	**3.0**	**35** " "
Dec. 3, 1977 to May 2, 1980[f]	Rice	1.5	1.5	1.0	--
	Wheat	1.5	1.5	2.0	35 " "
	Total	**3.0**	**3.0**	**3.0**	**35** " "
May 3, 1980 to Jan. 2, 1981	Rice	1.0	1.0	1.0	--
	Wheat	2.0	2.0	2.0	35 " "
	Total	**3.0**	**3.0**	**3.0**	**35** " "
Jan. 3, 1981 to Dec. 11, 1981	Rice	0.75	0.75	0.75	--
	Wheat	1.75	1.75	1.75	35 " "
	Total	**2.5**	**2.5**	**2.5**	**35** " "
Dec. 12, 1981 to until to-date	Rice	0.5	0.5	0.5	--
	Wheat	1.5	1.5	1.5	35 " "
	Total	**2.0**	**2.0**	**2.0**	**35** " "

Source: Collected and compiled by Office of Food and Agriculture, USAID/Dhaka, September 10, 1982.

Note: 1 seer = 2.057 lbs.

[a]Delivered to the cardholders through ration dealers every week in six statutory ration areas of the country. Children below eight years of age are entitled to half the adult quota.

[b]Delivered to the cardholders through ration dealers once in every fortnight or month. Allotment varies according to requirement and availability of commodities and the maximum limit is maintained within the aggregate of weekly quota. Children quota is same as SR.

[c]The quota is effecting for government employees and school teachers only who draw their ration from the appointed dealers. The amount of ration to be drawn by the remaining other priority categories (orphanages, universities, colleges, schools, hostels) is based on their demand and is drawn directly to or through agents.

[d]Those who qualify by reason of employment in factories, employing fifty or more employees. Ration is drawn either directly or through agents.

[e]There is no fixed quota for other categories of the rationing system.

[f]From early October to early December 1979, for the statutory rationing area of Dhaka only, the cereal quota was changed to two seers of rice and one seer of wheat to help lower rice prices in the free market.

residual to the ration needs of both the statutory and "priority categories" (items 3, 4, 5, and 6 above--see Table 4.1, footnote a) and are subject to the level of monthly allocations from the Food Ministry. If the residual is reduced, the modified rationing entitlements for the month are reduced. If there is no residual, the allocation will not be made by the Ministry to modified ration cardholders. Much of the monthly and annual fluctuation in offtake in the modified rationing category is seemingly attributable to these administrative vagaries.

The quota of two seers per week provides an estimated energy equivalent of about 930 calories per adult day, which is about 41 percent of the 2248 calories per day recommended for Bangladesh.[21] At three seers, the energy equivalent is about 1,390 calories per adult or 62 percent of the daily recommendation.

The amounts of food distributed annually under the rationing system have ranged from 1.4 to 2.6 million long tons since 1973 (Table 4.1). In recent years, the priority categories have received the highest allocations, but all three of the major rationing categories have been consistently over 300,000 tons annually.

The ration prices for the subsidized foodgrains are administratively determined. Normally, the interaction of pressures by recipients for reduced prices, the government's political situation, the pressures of inflation, and the BDG budgetary burden of the subsidy combine to determine price levels. The donor community has also been an important factor in determining BDG pricing policy, especially in more recent years. Historically, rationing prices have not closely approximated equivalent domestic market prices (Table 4.3). Until 1977, the rationing price for rice was less than 50 percent of the retail market. Upward adjustments since then have not totally kept pace with inflation or eliminated the differential. But, in 1982, the rationing price for rice had increased to 79 percent of the domestic market price.

Rationing prices for wheat have consistently represented a higher proportion of the market price. In 1982, the prices of wheat reached a level of 91 percent of the free market price. The rationing prices are the same for all except two classifications. The "Essential Priorities" classification receives foodgrain at a lower than regular (but unpublished) price. Flour mills and employees of large companies pay a premium of Tk. 5 above the prevailing rationing price.

The difference between the rationing price and the domestic market price reflects the magnitude of the economic benefit which accrues to ration cardholders by virtue of their entitlement of purchase at the subsidized price. In another sense, it is indicative of a marginal price incentive which is being denied farmers by the sale of rice at lower than market prices. The rationing system results in a subsidy to cardholders which is

TABLE 4.3
Ration and Domestic Market Prices of Foodgrains, Bangladesh, 1973-82

Fiscal Year	Rice: Ration Price	Rice: Domestic Market Retail Price (coarse rice)	Rice: Ration Price as Percentage of Market Price	Wheat: Ration Price	Wheat: Domestic Market Retail Price	Wheat: Ration Price as Percentage of Market Price
		(taka/maund)[a]	(%)		(taka/maund)[a]	(%)
1973	30	85	35	--	--	--
1974	42	112	37	--	--	--
1975	60	231	26	--	--	--
1976	73	136	54	59	90	65
1977	90	124	73	70	78	90
1978	95	157	61	75	95	79
1979	102	171	59	81	97	84
1980	123	226	55	93	132	71
1981	143	192	75	111	124	90
1982	166	211	79	120	132	91

Sources: World Bank, Report No. 3768, March 3, 1982, p. 294; Bangladesh Bureau of Statistics, **Monthly Statistical Bulletin of Bangladesh**, December 1981; and Bangladesh Bureau of Statistics, **Economic Indicators of Bangladesh**, June 1982, p. 71.

Note: Annual price calculations are weighted by the number of days in a year when the price was effective.

[a]Rounded to nearest taka.

assumed directly by the BDG. The variance between the ration sale price and the cost of domestically procurred foodgrains (purchase price plus management, handling, and storage) is one portion of the direct subsidy. The size of the direct subsidy is increased further by the importation of higher cost foodgrains for the rationing system under regular commercial agreements which are paid for with foreign exchange and sold at subsidized ration prices. A third part of the subsidy is the difference in the cost of donated food which is sold at the ration price and its alternative cost at world market prices, which is borne by donors.

The total subsidy in 1982 was Tk. 1.97 billion when estimated in terms of a total economic value,[22] up slightly from Tk. 1.95 billion in 1981. The 1980 subsidy of Tk. 3.75 billion was one of the highest on record and resulted from the increased proportion of offtake which had to be met by high cost imported rice. The pressures on the subsidy were reduced somewhat in July 1983 when the rationing and procurement prices were equated for the first time. The intent of the BDG is to continue this policy.

Based on the definitions of qualification to receive ration cards under the various programs, it is obvious that the subsidized distribution program primarily benefits the urban population. According to one estimate based on the 1973-74

expenditure survey, lower income urban residents received 90-100 percent of their total foodgrains from ration sources (Table 4.4).[23] The percentage declined to 65 percent for those with higher incomes of Tk. 500-749 per month. Even for those with the highest incomes, 60 percent of foodgrain consumption was from the rationing system. In some cases, more than 100 percent of total consumption came from the rationing system. This is the result when extensive amounts of rationed grains are resold in the open market, or when large numbers of illegal ration cards are being used.[24]

Rural residents, on the other hand, received a maximum of 14 percent of their total consumption from rationing sources. The estimate shows that about 9.2 percent of the population (urban) received about 55 percent of the total foodgrains. The remaining 45 percent of the ration was distributed to 90.8 percent of the population which is rural. If special groups such as governmental employees, school teachers, military, and other urban-like occupations living in rural regions are excluded, the analysis estimates that only 34 percent of the ration went to rural consumers. Among these rural recipients, it is probable that some live in rural villages and constitute segments of the "rural elite." These distortions mean that those of the rural population least able to tolerate high grain prices are forced to make purchases in the marketplace. Mainly these are the landless, the very small farmers, and those rural residents who engage in nonfarm occupations.

The intervention of the BDG into the marketing and distribution of foodgrains has caused distortions in the agricultural system. The rationing system influences the orderly and efficient allocation of resources by impacting negatively on producer incentives and by burdening the government which must absorb the subsidy at the national level. The total demand structure for foodgrain is different from the norm one would expect in the absence of the subsidry system. Prices are being constrained, and producer incentives and consumption levels are distorted. The system of ration distribution which favors the more affluent, urban population also must have a deleterious effect on the nation's income distribution.

Perhaps of greatest consequence is the fact that this system has become institutionalized into the political fabric of Bangladesh and, in the process, has reinforced an orientation toward food security for the urban populace that has worked against harnessing the rather favorable resource base for agricultural development.[25] The system operates almost entirely on food aid and its ready availability. It has created disincentives that have allowed governmental support of agricultural development to be less than is necessary as well as discouraged more productive producer investment. Continued widespread reliance of the BDG on food assistance after ten years since independence is de facto evidence that the system is not

TABLE 4.4
Estimated Distribution of Ration Foodgrains Among Income Groups, 1973-74

Income Groups (taka/month)	Rural			Urban		
	Total Actual Consumption (lb/capita)	Ration Received (lb/capita)	Ration as % of Consumption (%)	Total Actual Consumption (lb/capita)	Ration Received (lb/capita)	Ration as % of Consumption (%)
Under 100	168.18	24.14	14	263.11	235.80	90
100-149	221.99	21.94	10	277.11	261.50	95
150-199	269.70	29.08	11	299.85	317.60	106
200-249	307.02	32.59	11	326.80	337.80	103
250-299	325.32	36.33	11	338.17	340.50	102
300-399	357.95	31.72	9	358.44	323.70	90
400-499	375.00	30.13	8	359.43	381.73	78
500-749	402.94	27.49	6	380.69	249.00	65
750-999	429.63	24.83	6	391.81	251.80	64
1000-1499	452.38	--	--	406.15	246.60	61
1500-1999	436.80	--	--	417.52	250.70	60
2000 & above	456.58	--	--	401.95	239.90	60

Source: Raisuddin Ahmen, "Foodgrain Distribution Policies Within a Dual Pricing Mechanism: The Case of Bangladesh," **Development Issues in an Agrarian Economy--Bangladesh,** Center for Administrative Studies, University of Dhaka, 1981, p. 110.

yet working effectively and that the agricultural sector has not played the role it might have in overall growth and development.

Jute

Jute generates the largest share of the export earnings of Bangladesh. In recent years, the nation has lost most elements of its prior near-monopoly position in world markets and now finds itself in close worldwide competition both with other nations and with synthetic fibers. The importance of market efficiency has been heightened in the search for means to maintain its stability.

The marketing system for jute is a combination of central government and private sector involvement. The annual production is marketed through the general system previously described -- from village markets to kutcha bailing centers or secondary markets to its final destination. For that portion exported, the fibers are pucca bailed and dispatched through the terminal export market. For the amount used locally, the material is moved to warehouses (godowns) and eventually to local mills for processing into a variety of products, most of which are exported. Jute is processed into items such as twine, rope, carpets, and carpet backing.

At the time of independence, the jute export trade was nationalized under the Bangladesh Jute Export Corporation (BJEC). The corporation was entrusted with full authority and responsibility for all jute export sales. Subsequently, the government released its total monopoly, and today private sector shippers are allowed to export jute in their own name and with individual company marks and brands. The BJEC also engages in export on behalf of the Government of Bangladesh. However, all private exporters are licensed by the BDG.

Domestic jute industries were also nationalized after independence under the management of the Bangladesh Jute Mills Corporation (BJMC) to promote the domestic development of jute products being produced under the jurisdiction of the existing complex of mills in Bangladesh. The BJMC subsequently released six specialized mills producing jute twine to the private sector.[26] The government has operated seventy-seven mills which produce for export. In addition, two jute carpet mills established in cooperation with the Government of Iraq are government-managed. The private sector has operated two carpet mills in addition to the twine-making facilities. The jute marketing system also incorporates 12,500 godowns for storage which are managed by both the public and private sectors.[27] However, the recent focus on private sector participation by the BDG has led to initial attempts to shift management of many of the publically operated jute facilities to the private sector. Reportedly, as many as thirty-three factories have been identified for transfer,

and negotiations with prior owners are in various stages of completion.

Government interventions are apparent in the domestic pricing of jute. Under government regulation, a statutory minimum price exists below which jute cannot be marketed. The statutory minimum acts as a "floor price," and regular trading occurs in the open market generally at levels above the minimum although seasonal price variations sometimes challenge the floor price. A similar price setting mechanism operates with export sales through an export price check mechanism known as the Minimum Export Price (MEP). The price is established by the Price Advisory Committee represented by the governmental jute corporations, i.e., Jute Marketing Corporation (JMC) and the Jute Trading Corporation (JTC). These two corporations function as government traders to help maintain domestic prices at the statutory level. However, their lack of funds to engage in extensive market purchases seriously limit their ability to perform this function. Furthermore, export prices are determined by world market conditions and export sales may go forward on individual initiatives at whatever price above the minimum export price.

The jute market system appears to operate in a competitive way. Prices are freely determined, and entry by market functionaries at any level appears to be reasonably free. The direct intervention of government in establishing "floor prices" is rendered ineffective as a price support mechanism by the lack of adequate funds to engage in significant open market operations. As a result, price declines cannot be checked and jute producers are left with essentially no guarantees. In 1981, for example, the government actually suspended its price support program in the face of drastic domestic price declines and did not provide any useful alternative for insuring the price level.

Sugarcane

Governmental intervention into sugarcane marketing virtually controls the entire production/marketing sequence. Prices are announced annually by the Bangladesh Sugar and Food Industries Corporation (BSFIC) which serves as the BDG central control authority for sugar production and development. All cane is sold to the sugar mills at the fixed price. Bangladesh's fourteen sugar mills are governmentally controlled and operated. Their combined production capacity is 159,000 long tons based on 120 days of crushing annually.[28] No processing of cane is permitted in private sector mills. However, cane is processed extensively into gur as a home activity.[29]

The price guarantee program does not include acreage control nor does it assure purchase of all cane production. Plant purchases at the fixed price are limited to that quantity of cane needed to fill the production schedule of the sugar mills. In

1980, the total factory complex operated at 88.2 percent of rated capacity. Their average sugar recovery rate in percentage of cane crushed is normally 7.5 to 8 percent. The factories are located in eleven districts throughout the country. Currently, 36 percent of the total cane acreage is located within fifteen "sugar mill zones" designated by the Bangladesh Sugar Mills Corporation (BSMC). Under provisions of the Gur Control Order, all cane production within these areas must be offered to the processing mills at the fixed price. The order is intended to guarantee a supply of cane for the BDG-operated mills.[30]

All refined sugar is marketed by the Bangladesh Sugar Mill Corporation. A large share (perhaps 70 percent) is sold through the national rationing distribution system. Added amounts are sold to approved dealers and others such as manufacturers who use sugar extensively in their production processes. Amounts in excess of these two needs are sold in the market. The retail price of domestically produced sugar is set by the BDG. Imports of sugar are permitted with governmental approval to fill domesti. shortfalls. Interestingly, the retail price of imported sugar is not controlled.

Likely, much of the motivation for the strong intervention of the BDG in the production and marketing of cane and sugar arises from the decision to nationalize the processing sector in 1972. The nationalized system has placed strong pressures on the management entity of government which has not always provided adequate direction. For example, a 1978 decision to export 28,000 metric tons of sugar, before the 1979 domestic production situation was clear, led to a serious shortfall in 1979 and severe price fluctuations to consumers, which, in turn, had serious impacts on production decisions of producers in both 1980 and 1981.

Furthermore, the processing mills are not modern. The newest plant at Faridpur began operating in 1977. Six other plants came into production between 1966-71. The rest are pre-1959 vintage, three of which began producing in the 1930s. The outdated factories and low sugar extraction rates are the major factors accounting for unusually high production costs.

The most important cost factor, however, is the high price guaranteed to producers which often leads to prices as much as three times above the world price. Grower response has been significant and Bangladesh has reached a level of domestic sugar production which approaches self-sufficiency. The policy is demonstrative of the effect price can have on agricultural output, but it also leads to a critical misallocation of BDG resources where the price is fixed so far above the world price. The resource cost of sugar to Bangladesh would be much less if sugar were imported, given the set of producing constraints currently in place. The high raw product prices and inefficient production processes are devastating. In fact, net benefits might result if sugar were imported and the released land

utilized for rice or other food production. The details require close study, but the case is indicative of the options available to Bangladesh and the need to engage in basic analysis to establish internally consistent policies.

Tobacco

Tobacco is a relatively minor crop in Bangladesh, but its success since independence and the policy format utilized by the BDG are important illustrations for the sector. At the time of independence, Bangladesh was reportedly dependent for about 95 percent of its tobacco needs as a consequence of most tobacco production having been located in the regions which became West Pakistan. By about 1980, the nation became self-sufficient.

Tobacco production and marketing have a minimum of BDG intervention. Minimum grower/processor prices are fixed by the BDG, but prices are free to respond to supply and demand above the minimum level, and payments to growers occasionally exceed the minimum price, particularly for quality production. Minimum BDG prices usually prevail, however, since production in normal years is sufficiently large to pressure demand requirements at that price. Prices paid to growers do not normally exceed world prices. There are no acreage controls. The BDG does not engage in tobacco procurement to maintain prices in good production years.

Pricing at retail for manufactured cigarettes has previously required BDG approval. In recent months, however, the BDG has relaxed this requirement. Increases in retail prices must be reported to the BDG prior to their becoming effective, but price changes may be implemented without official BDG concurrence. The statutory requirement for pricing approval has not been removed, but the operational system has become much freer. There are no special BDG interventions in the export of tobacco. Bangladeshi tobacco is of a quality to compete in world markets.

The interests of the BDG were previously vested primarily in the Bangladesh Tobacco Board (BTB) which approved all administrative issues. In recent months, the responsibilities have been moved more to the marketing division of the MOA. The processing segment of the industry is composed of seventeen factories, sixteen of which are privately owned. The other, the Bangladesh Tobacco Company (BTC), the largest of the group, is jointly held by the BDG and the British Tobacco Company. The BTC utilizes forward contracting arrangements whereby growers are registered with the company and produce only for BTC. The growers are given guaranteed markets, extension assistance, and fertilizer and seeds on credit against the upcoming crop. No price guarantees are made except the minimum levels announced by the BDG. In addition to the factories which produce machine-made cigarettes, a large cottage industrial-type segment of the

industry produces cigarettes by hand. Production is carried on mostly in the home on a contract-piece basis.

Oilseeds

Bangladesh obtains about one half of its oilseed needs from local sources. Domestic production comes mainly from mustard and sesame seed. Imports are mainly of palm oil and soybean oil. A portion of the latter comes from the U. S. as part of that nation's food aid program to Bangladesh.

There are limited governmental interventions into the marketing of oilseed products. Domestic grower prices are market determined as are retail prices of vegetable oils. Of the nine factories which produce oil consumables, five are under governmental control and four are operated by the private sector. Additionally, the BDG controls the importation of oilseeds and unrefined oil which are used in the governmental and private plants. Oils from mustard seed are produced extensively in individual home units.

Cotton

The production of cotton and the manufacturing of fine cotton textiles in Bangladesh dates back to the middle ages.[31] While growth in textile facilities has continued in recent years, the supply of raw materials to support the industry has not kept pace. In 1980, 95 percent of the raw cotton used in domestic manufacturing was imported as were large amounts of yarns and textiles. Importations in 1981 and 1982 were even higher. There has been a slight increase both in domestic acreage and production of cotton since 1977, but basically the textile industry is dependent upon imported raw materials.

There is heavy intervention by the BDG in production and marketing of cotton and textile products. Domestic cotton prices are fixed in advance. Purchases are made by the Bangladesh Textile Mills Corporation (BTMC), which was established in 1972 to supervise the sixty-one operational textile mills owned by the BDG. In addition to the public sector units, BTMC is responsible for the specialized mills and powerlooms in the private sector, the handloom sector, and the ready-made garment industry. The private sector also forms an important part of the textile industry, especially in weaving (handlooms) and to a lesser extent in ready-made garments. Most of the private sector enterprises are small-scale units. BTMC also is entrusted with the importation of all new cotton imports and the bulk of staple fiber imports.[32]

The pricing of domestically produced yarn and cloth is dictated by the BDG. Prices are set on the basis of costs of production which do not always account for differences in product quality or cost structures of various factories. Price levels

are reviewed periodically. The distribution of yarn and cloth involves a mixture of private and public institutions. BMTC distributes through its own retail outlets, but extensive sales are made to the Bangladesh Handloom Board (BHB), the weavers cooperatives, and additional private dealers who are associated with individual mills. These entities, in turn, market large amounts of their production directly through retail outlets.

Other Agricultural Products

All other agricultural commodities are free of BDG interventions. Among the important crops for local consumption are potatoes, pulses, spices, fruits, and vegetables. No special governmental price or marketing-assisted programs are in place, although the BDG has encouraged investment in cold storage by the private sector through credit programs. Much of this capacity has been used for potatoes. Tea is the other relatively important crop. Despite the fact that sales occur in both domestic and international markets, tea sales and prices are market-determined. Tea is the only crop sold through a cooperative auction located in Chittagong. Both export and domestic traders obtain their supplies competitively through this channel.

Despite the expressed intent on the part of the BDG to more fully involve the private sector and to utilize market forces in mobilizing productive resources, the product markets in Bangladesh have a significant level of governmental intervention. The interventions are variously found in the control of production, distribution, and pricing aspects of the marketing process. The strongest interventions are in pricing at both grower and retail levels. Furthermore, controls are most prominent on crops which appear to be of most public importance, i.e., foodgrains, cloth, sugar, and jute. Such a pattern tends to support an earlier observation concerning the unwillingness on the part of governments to trust the marketplace to make allocations considered of high importance to national interests.

In general, the total market system for agricultural products appears to suffer from lack of a clear definition of the role the BDG should fill. For example, there is no consistent model or format surrounding current BDG interventions, despite the fact that the production and marketing systems for these crops are fairly homogeneous. All involve the production of primary raw products which are processed to some degree. Yet, the nature of the intervention into grower and retail prices vary among crops as do policy decisions with respect to private or public ownership of processing facilities and importation rights. Furthermore, the policies on minimum prices, with the possible exception of foodgrains, provides no realistic guarantee to producers. The BDG is ill-prepared financially to enter into purchases of sufficient scale to preserve the minimum price levels, especially if the downward movement of price is extreme, high

levels of government purchase. Prior experiences show that the government has simply not been able to meet its obligations, leaving growers to bear the cost of surplus production. The major impact of the minimum price system appears to be one of misallocating resources without positive benefit. If minimum prices cannot be fully supported by the BDG, there is a strong argument that the policy should not exist.

Finally, the inequalities and nondevelopmental orientation created by the foodgrain rationing system are extremely detrimental. A system devised in the early 1940s to assist Britain's war efforts is now essentially an urban welfare program which exacerbates an already desperate income distribution problem and encourages a misallocation of resources away from the agricultural sector whose improved productivity must provide the basis for sustained increases in national welfare. Among all of the product market interventions of the BDG, the foodgrain rationing system is the most serious and the one most in need of significant policy changes. The other interventions also are detrimental since they contribute to resource misallocations and the general policy disarray.

Factor Markets

The markets for factors of production for agriculture are less developed than the product markets, but the trends appear to be moving in the direction of greater reliance on market allocations with concomitant improvement in efficiency, especially for improved agricultural technologies. Governmental interventions, which were extensive in years past, are gradually being withdrawn in favor of private sector initiatives in the distribution and sales processes.

Fertilizer

Governmental intervention in the production of fertilizer is a direct consequence of the historical dependency of Bangladesh on outside sources and the presence of natural gas deposits in the Eastern region of the nation. The construction of production facilities prior to 1980 has made Bangladesh about 50 percent self-sufficient in urea fertilizer (Chapter 3). Completion of the Ashuganj factory in 1983 will bring approximate self-sufficiency, and the construction of additional facilities programmed over the next several years is intended to produce exportable surpluses, partly to help pay for the import of other chemical fertilizers which cannot be produced domestically.

Between 1973-82, Bangladesh imported 3.4 million metric tons of fertilizer (Table 4.5). Most has been urea and triple super phosphate which include nitrogen. The largest imports have

TABLE 4.5
Fertilizer Imports by Type, Bangladesh, 1973-81

Year	Type of Fertilizer					
	Urea	Triple Super Phosphate	Diammoniun Phosphate	Muriate Potash	Other	Total
	(1000 metric tons)					
1973	94	94	--	--	--	188
1974	--	98	--	21	24	143
1975	142	89	--	18	41	290
1976	98	186	--	27	--	311
1977	11	15	--	10	--	36
1978	296	129	--	31	--	456
1979	379	103	84	77	2	615
1980	287	173	42	60	11	573
1981	64	211	45	42	19	381
1982	250	145	36	26	--	457
	1591	1243	207	312	97	3450

Sources: USAID, **Fertilizer Distribution Improvement**, Project Paper Amendment, August 1981, Annex B-15; and USAID/Dhaka Food and Agriculture Office.

occurred since 1978 which corresponds with new BDG initiatives to privatize the fertilizer distribution system. Fertilizer has been received from about seventeen different donors, mostly as commodity assistance. The United States has provided about 28 percent of the total imported for the period.[33]

Fertilizer sales and distribution are one of two major agricultural input programs which have been promoted by the BDG (the other is irrigation technology). The emphasis is a recognition of the importance of fertilizer if agricultural productivity is to increase, and of past deficiencies in the distribution system. Concentration by the government on fertilizer distribution began in the early 1960s, long before the war with West Pakistan. During that period the East Pakistan Agricultural Development Corporation (now BADC) was established and initiated the developmental programs designed to increase

fertilizer use. These programs were continued after the war and generally prevailed until 1978.

Under these earlier programs, control of all fertilizer, including domestically produced supplies and imports, was the responsibility of BADC. A distribution system was established which had public and private sector participation. Fertilizer was moved from initial receiving points to either intermediate godowns (warehouses) or to thana level godowns. Intermediate godowns were established at 67 strategic distibution points and 423 thanas each had facilities where fertilizer could be stored and distributed.[34]

Movement from this point was given to private dealers but with continued governmental control. Reportedly, 20,000 to 30,000 individual dealers handled fertilizer. However, each was required to register with the BDG, and his sales territory was restricted to his own union within the thanas, an area which averaged about twelve and one-half square miles. Multiple dealers were permitted in each union. Furthermore, procurement had to be from the godown in his own thana unless use of an adjacent one would reduce transportation costs. General interthana movements of fertilizer were prohibited. The system proved incapable of meeting the higher demands as use rates increased, and a significant amount of black market trading occurred at prices above those of BADC.

The godown procurement prices were set by the BDG at a subsidized level. Discounts were provided dealers based on distance of transportation--Tk. 4 from zero to six miles and Tk. 6 above six miles. The sales price from dealers to farmers and the profit margin were both fixed.

In 1978, the BDG in cooperation with USAID initiated a new fertilizer marketing scheme designed to transfer more activity to the private sector and to improve distributional efficiency. The major reforms brought by the new marketing initiative freed the system considerably from governmental involvement:[35]

(1) BADC sales points were consolidated to a group of primary distribution points (PDP). Thana sales centers were retained only in inaccessible areas.
(2) Dealer registration was eliminated, thus increasing the numbers and freedom of entry.
(3) Dealer profit margins were increased at the PDPs to encourage entry and a wider distribution of fertilizer.
(4) Price discounts were given on larger quantity purchases at PDPs to facilitate wholesaling.
(5) All restrictions on fertilizer movement within the country were removed, except for border areas.
(6) All purchase quotas previously imposed on dealers were removed.

Construction of godowns to facilitate the distribution process has been a major activity in recent years. Currently, 118 godowns have been constructed at PDPs. Programmed construction will include about 88 additional units by 1985.[36] Godowns are being located at major centers where both water and land transportation can more effectively assist the distibution function. The thana level godowns have been essentially closed with the exception of a few remote areas where they continue to serve as distribution and storage units.

A more serious issue related to the program has been the continued subsidization of fertilizer prices by the BDG. The subsidy process was seen by the government, initially, as an incentive to encourage farmers to adopt fertilizer. However, the cost of the subsidy has grown and has imposed an extremely heavy burden on the overall developmental budget for agriculture.[37] The amount of the subsidy has generally increased since 1973, rising from Tk. 30 million in that year to Tk. 1.09 billion in 1981 (Table 4.6). The highest total subsidy was reached in 1979 at Tk. 1.44 billion. The subsidy has increased from only 2 percent of the developmental budget and expenditures for agriculture in 1974 to 25 percent in 1981. In 1978, it reached its highest proportion at 54 percent. Present BDG policy, induced in large part by the World Bank, is to hold the subsidy to Tk. 1 billion, maximum.

The increasing burden of the subsidy has brought continuing pressures for a reduction. The subsidy is determined by the composite of the price differential between procurement costs for BADC and the selling price to users and the amount of fertilizer sold. The subsidy, as a percentage of total procurement costs to BADC, has changed annually and also varies by type of fertilizer. In 1979, the composite average unit subsidy was 50 percent of the total procurement costs.[38]

The pressures on the governmental budget plus those of donors who wish to see fertilizer reach full market price and eliminate the subsidy altogether have led to significant fertilizer price increases, especially since the new marketing program began in late 1978 (Table 4.6). From the level of 1978, prices were increased 42 percent by 1980 and 70 percent by 1981. The latest increase in 1982 means that prices have risen 107 percent since 1978. The 1982 price increase also reduced the average unit subsidy to 27 percent of total BADC procurement costs.

Despite the consistent increase in price since 1972, fertilizer distribution has shown a continual upward trend. Between 1978-80, fertilizer use rose 17 percent even with the 42 percent price increase. Sales in 1981 increased 4 percent despite the fact that fertilizer prices rose 20 percent more between the two years. Fertilizer usage in 1982 was reduced 5 percent in the face of the additional price rise of 22 percent. However, the reaction of growers to price increases is only one factor influencing use. Fertilizer availability and drought

TABLE 4.6
Fertilizer Pricing, Use, and Subsidy, Bangladesh, 1973-82

Fiscal Year	Fertilizer Price (taka/ maund)[a]	Fertilizer Distributed (1000 long tons)[b]	Subsidy to Users (taka billion)[b]	Proportion to Agricultural Budget[c] (%)
1973	18.1	384	NA	NA
1974	31.9	380	0.03	2
1975	46.4	280	0.15	14
1976	46.4	458	0.49	25
1977	55.9	516	0.64	31
1978	55.9	715	1.18	54
1979	64.9	742	1.44	46
1980	79.3	838	1.25	32
1981	94.9	875	1.09	25
1982	115.6	829	NA	NA

Sources: [a]Richmond Allen, "Agriculture Pricing," Internal USAID Memo, August 24, 1981. Prices are annual average for all types of fertilizer. Weights: Urea/DAP, 69.7%; TSP, 24.8%; and MP, 5.5%; [b]World Bank, Report No. 3768-BD, March 3, 1982, p. 106; and World Bank, Report No. 2761-BD, December 19, 1979, p. 76; and [c]Agricultural budget is defined as BDG allocations to agriculture from the recurrent budget (Table 6.1) and ADP allocations for agriculture and rural development (Table 6.5).

NA = not available.

conditions also appeared to critically condition the demand for fertilizer in 1982.

Furthermore, growers have previously demonstrated a willingness to pay higher prices for fertilizer, as evidenced by the black market activities in 1977 and again in late 1981. Also, the rice/fertilizer price ratios in Bangladesh are still reportedly better than in most neighboring countries (Table 4.7). There are some dangers in such intercountry comparisons and they should only be viewed as indicative without total corroboration. But the magnitudes are sufficiently great to suggest that price increases might still be safely implemented. The data in Table 4.7 imply that urea prices could be increased 179 percent to reach the Thailand price ratio of rice to urea, 100 percent to

TABLE 4.7
Urea, Paddy, and Rice Prices in South Asian Countries, 1982
(U.S. dollars/long ton)

	Urea	Paddy	Rice	Price Ratio Paddy/ Urea	Price Ratio Rice/ Urea
Bangladesh[a]	167.12	156.99	240.55	0.94	1.44
India	276.19[b]	126.31	(199.50)[c]	0.46	0.72
Pakistan	164.35	(100.00)[c]	160.10[d]	0.61	0.97
Sri Lanka	137.69	136.22	(214.30)[c]	0.99	1.56
Thailand	373.91	121.74	(192.60)[c]	0.33	0.52
World Market	190.00	(135.00)[c]	212.00[e]	0.71	1.12

Source: World Bank, unpublished report, 1982.

[a]Calculations based on pre-July 1982 prices. If July 1982 prices are used, the values are: urea ($183.10), paddy ($179.40), and rice ($266.01). Care should be exercised in comparing these ratios with those of the other nations since their price data does not reflect changes which might have occurred in July 1982.

[b]Including 7% state sales tax (average; actual range is 4-10%).

[c]Price quotations given in parentheses are derived by applying 3:2 rice/paddy conversion ratio and assuming a uniform milling cost estimate of U.S.$10/ton. Exchange rates used are:

Bangladesh--taka 21.50/US$ Sri Lanka--rs. 20.55/US$
India-------rs. 9.25/US$ Thailand---baht 23.00/US$
Pakistan----rs. 11.50/US$

[d]40% broken rice.

[e]Adjusted for quality difference with factor of 0.65.

achieve equity with India, and 48 percent to achieve the Pakistan ratio.*

*Concerns are being expressed over the impact rising fertilizer prices have on subsistance farmers who do not market their rice and wheat output and therefore, do not directly benefit from the market price structure.

BDG interventions into the fertilizer markets are obviously reduced since initiation of the new marketing program in 1978, particularly at local wholesale and retail levels. Even though BADC continues to control the early distribution phases of the marketing system, the present construction of godowns at PDPs is indicative of increased efficiencies since distribution points are now being located on major traffic arteries rather than being distributed only to political subdivisions. At the retail level, entry of dealers has been eased which should be consistent with increased competition. Also, all restrictions on interdivision movements of fertilizer have been removed. An evaluation of the new marketing system after one year concluded that farmers had considerably better access to fertilizer than before.[39] The government has continued to fix retail prices of fertilizer until very recently. In March 1982 a test of free market pricing in the Chittagong division was initiated. In April 1983, the policy was extended to all other Divisions as the final step in freeing the retail level of major governmental controls. Discussions are presently in process to establish a final project phase which would free the early distribution phases by permitting the private sector to purchase fertilizer at ports and domestic factories (rather than only at PDPs) and distribute in competition with BADC.

Irrigation Technology

The marketing of improved irrigation technologies has retained much influence of the BDG until very recently. For the most part, the controls have been implemented through the auspices of the BADC, which has been responsible for the conduct of BDG programs designed to increase the adoption of new agricultural technologies. In the case of irrigation, the programs included low-lift pumps, deep tubewells, shallow tubewells, and hand pumps.

The intervention of BADC in the low-lift pump program has been reduced somewhat in recent years. BADC still rents pumps as before, but the major marketing innovation has been the direct sale of pumps to individual farmers and the policy to sell all old rental units. Lines of credit have been established through commercial banks for growers who can qualify. Sale prices, however, remain subsidized. BADC acquisition costs for a pump with a capacity of two cubic feet of water per second has approximated Tk. 37,700, but the sale price was only Tk. 22,000.[40]

The development of deep tubewells (DTW) has been the program involving the most government intervention. DTWs were not only drilled by BADC, but the ownership rights were retained and a large share of the maintenance responsibility was assumed. The high degree of intervention was deemed necessary since the command areas for the volume of water produced by DTWs exceed

that commonly required by a single individual. BADC intervention was to encourage group involvement and acceptance of the technology. More recently, the procedures have been liberalized to permit groups of farmers to obtain private rights to deep wells drilled by BADC.* The process has been highly subsidized by the BDG. The full cost of DTW development typically runs as high as Tk. 400,000. The farmers purchase cost has been about Tk. 85,000.[41]

The marketing of shallow tubewells (STW) also has reflected BADC intervention. BADC distributed all pumps, pipe, motors, casings, and strainers, in addition to providing drilling services. The same lines of grower credit existed for shallow as for deep tubewells. Full ownership of the STW eventually passes to the individual or group. Individuals were also free to engage in drilling wells on their own initiative. In these cases, necessary well equipment such as pumps were provided by BADC. Some subsidy was involved, but it was much less than for DTWs. However, during the last two years, full cost pricing has been implemented for drilling STWs. Also, pumps and related accessories are being marketed by the private sector.

The distribution and sale of the cast iron hand pumps has been handled mostly by BADC. Both the wholesale and retail prices were fixed. The price structure was subsidized by about Tk. 600 per unit.[42] The intent was to price the pumps at full cost and have the private sector engage in their distribution. Some private distribution has occurred, but it has been very limited since the firms could not compete with the subsidized price structure of BADC. However, other types of less costly handpumps are being manufactured and distributed by the Mennonite Central Committee, the Rangpur/Dinajpur Rehabilitation Services, CARITAS, and more recently a few private small-scale producers.

All of these interventions by the BDG in the marketing of small irrigation equipment and services will be ending with the implementation of conditions associated with the World Bank's recent Import Credit Programs. The latest agreement provides for full-cost pricing of all irrigation equipment and services (except DTWs) and the eventual involvement of the private sector in all aspects of procuring, distributing, and maintaining the equipment and services. It will take time for the system to be recast with more private sector input. Most of the changes are in process and are programmed for completion by 1985. If successful, the inefficiencies of and resource misallocations associated with BDG interventions will no longer be at issue.

*The cooperative programs of IRDP have been especially active in arranging development and purchase for groups under their jurisdiction.

Credit

The market for agricultural credit is governed as part of the general structure for the national banking system in Bangladesh. Agricultural credit is administered by separate institutions located throughout the country. Interventions into the system by the BDG are of conventional forms often found in developing nations: (1) general banking rules and regulations associated with the nationalized status of the banking system; (2) subsidy of interest rates and related operating costs; and (3) overall loan regulation including specification of loan security requirements, borrower qualifications, size of loan limitations, and type of commodity for which loan funds can be used. The system is characterized by emphasis on lending as opposed to developing viable financial intermediation, particularly the generation of savings and the mobilization of domestic resources.

The Bank of Bangladesh (BB) exercises control over the agricultural credit system as the nation's central bank. Agricultural credit programs are administered and implemented by a set of subsidiaries including the Bangladesh Krishi Bank (BKB); the six Nationalized Commerical Banks (NCB) at Agrani, Janata, Pubali, Sonali, Rupali, and Uttara; the Bangladesh Samabaya Bank Limited (BSBL); plus affiliated cooperatives. Additionally, the IRDP cooperatives which operate independently are refinanced by the Sonali Bank.[43] The BSBL serves as the apex bank for traditional cooperatives in Bangladesh which presumably have most direct contact with the agricultural sector. The institutions represented under the BSBL structure include sixty-two central cooperative banks, twelve central sugarcane growers, cooperative societies, and sixteen cooperative land mortgage banks. Membership in these institutions is reportedly associated with 30,000 village type primary cooperatives throughout Bangladesh.[44]

The bank system is extensive and well-distributed throughout the country (Table 4.8). In 1982, 4,470 branches of all classifications of banks were in operation. Thirty percent were in Dhaka Division, but the distribution of branches throughout the country was good and provided access to credit in most districts. There also has been an upward trend in the number of branches in operation since 1977. An estimated 2,405 new branches have been opened during the six-year period from 1977-82.

Disbursal of credit to the agricultural sector by the major banking institutions was estimated at Tk. 4,034.4 million in 1982 (Table 4.9). This represented a nominal increase of 16 percent over 1981 and about four times the disbursements in 1977. The BKB had the largest loan portfolio and also showed the largest growth. Its loans in 1982 were almost double those of 1980. Much of the lending growth in the system was related to the Tk. 100 Core Special Agricultural Credit Program (SACP) initiated in 1977. The loan responsibility for these funds was placed with

TABLE 4.8
Bank Branches in Operation, Bangladesh, 1977-82

Division/District	1977	1978	1979	1980	1981	1982
Rajshahi	**431**	**632**	**731**	**853**	**1001**	**1026**
Dinajpur	64	93	112	127	149	155
Rangpur	104	134	163	195	237	240
Bogra	74	112	130	145	166	173
Rajshahi	118	181	198	230	267	271
Pabna	71	112	128	156	182	187
Khulna	**356**	**493**	**604**	**677**	**808**	**823**
Kushtia	53	76	95	107	130	133
Jessore	74	107	145	167	196	200
Khulna	114	146	179	196	238	239
Barisal	80	120	138	155	175	180
Patuakhali	35	44	47	52	69	71
Dhaka	**640**	**812**	**991**	**1116**	**1327**	**1348**
Jamalpur[a]	119	156	47	58	85	86
Mymensingh			148	174	13	220
Tangail	30	41	64	81	107	108
Dhaka	413	518	616	659	742	752
Faridpur	78	97	116	144	180	182
Chittagong	**638**	**820**	**932**	**1039**	**1242**	**1273**
Sylhet	171	222	258	284	342	351
Comilla	136	182	218	248	299	303
Noakhali	102	127	139	157	201	203
Chittagong	205	260	281	305	349	361
Chittagong Hill Tracts[b]	24	29	36	45	51	55
Total	2065	2757	3258	3685	4378	4470

Source: World Bank, Report No. 4277-BD, March 4, 1983, p. 156.

Note: Includes all branches of scheduled commercial banks and of specialized financial institutions, including 20 branches of foreign banks and one joint-venture bank.

[a]Jamalpur was a subdivision of Mymensingh until December 26, 1978.
[b]Including Bandarban.

the major agricultural credit institutions (except for BSBL and IRDP). The growth in lending by the BSBL has been significant since 1977 but showed a definite downturn in 1982. The volume of funds distributed since 1977 appear limited in relationship to

TABLE 4.9
Agricultural Loans Issued by Major Credit Institutions, 1977-80 (millions of taka)

	1977	1978	1979	1980	1981	1982
Commercial Banks[a]						
Short-term agricultural loans	496.1	767.1	648.2	874.4	1038.4	949.8
Other agricultural financing[b]	7.2	5.4	5.0	9.5	57.0	113.5
Fisheries financing	0.1	11.1	37.7	27.0	11.2	10.8
Tea production and development financing	29.2	35.4	63.3	66.5	27.6	36.3
Cold storage facilities for ag. products	27.5	26.1	22.9	35.6	36.1	62.2
Total	**560.1**	**845.1**	**777.1**	**1013.0**	**1168.5**	**1172.5**
Bangladesh Krishi Bank						
Short-term agricultural loans	96.9	186.9	173.2	255.4	730.4	1099.6
Other agricultural financing[b]	119.9	160.3	268.4	688.6	657.2	926.9
Fisheries financing	0.6	13.7	39.5	47.5	73.7	69.5
Tea production and development financing	161.8	179.0	247.5	411.7	579.6	563.0
Cold storage facilities for ag. products	9.2	2.4	13.1	16.8	46.5	51.4
Total	**388.4**	**542.3**	**741.7**	**1420.0**	**2097.4**	**2710.4**
Bangladesh Samabaya Bank Ltd.						
Short-term agricultural loans	93.6	131.4	165.9	224.5	207.0	137.2
Other agricultural financing[b]	18.2	26.8	35.2	31.3	50.0	36.9
Total	**111.8**	**158.2**	**201.1**	**255.8**	**257.0**	**174.1**
All Major Credit Institutions						
Short-term agricultural loans	686.6	1085.4	987.3	1354.3	1938.5	2166.8
Other agricultural financing[b]	145.3	192.5	308.6	729.4	765.1	1075.9
Fisheries financing	0.7	24.8	77.2	74.5	84.0	79.7
Tea production and development financing	191.0	214.4	310.8	478.2	605.7	599.3
Cold storage facilities for ag. products	36.7	28.5	36.0	52.4	73.8	112.7
Total	**1060.3**	**1545.6**	**1719.9**	**2638.8**	**3457.2**	**4034.4**

Source: World Bank, Report No. 4277-BD, March 4, 1983, p. 157.

[a]Includes refinancing provided by Sonali Bank to TCAAa/KSSs under the IRDP.
[b]Includes agricultural term credit as well as financing for marketing, transport, and agroindustries.

the integral and long-standing relationship of the bank with cooperative organizations.

Existing evidence presents a strong case that lending from formal credit institutions is not meeting the needs of the agricultural sector. For example, since 1973, annual new agricultural disbursements have amounted to from 0.5 percent to 4.4 percent of the value of production in agriculture (GAP). The highest ratio occurred in 1982. By comparison, the same ratio for Honduras ranged from 20 percent to 43 percent during 1951-79 Studies from other countries, such as the Philippines and some nations in Latin America, show similarly higher ratios than for Bangladesh and confirm the general deficiency of formal credit disbursements to the agricultural sector.[45] Furthermore, growers responding in the land occupancy survey indicated that only 30 percent of the loans for landowners and 15 percent for tenants were obtained from regular banking institutions. An estimated 50 to 60 percent of all loans (depending on landownership class) were negotiated through informal credit sources.[46]

A 1979 nationwide study of 418 rural thanas by the Ministry of Land Administration and Land Reforms provides corroborating evidence. Of the total amount borrowed by farmers, 45 percent came from informal institutional sources. No data were reported on number of loans by source of credit. However, the trend shows that the amount taken from informal credit sources decreased as farm size increased. At the extremes, those with less than 0.5 acres borrowed 86 percent of their funds from informal private lenders, while those with 0.5 to 1.5 acres obtained 71 percent from the same source. Those with holdings between seventeen and twenty-five acres used formal institutional sources to secure 98 percent of their funds. Average interest rates from all sources by land size class ranged from 70 percent to 110 percent, with the higher rates being paid by the holders of smaller land sizes who borrowed from informal lenders.[47]

A large portion of the credit needs of the sector are being satisfied outside the major credit institutions and in a private market setting which is not subject to the direct controls and conditions associated with BDG institutional lending. The characterisitics of this credit market are not well-known. Interest rates are reportedly high in comparison to those of BDG institutions.[48] But no analysis of the competitive structure or potentials for exploitation of growers has been made. There are no BDG interventions into these markets except possibly for legal regulations which apply to the general area of business contracting in Bangladesh.

The institutional credit markets, however, do have BDG interventions in some fairly critical areas. Perhaps the most obvious and most important is the subsidy to the system which permits its continuance. Much of the need for a subsidy grows out of several policy and structural deficiencies which render the system incapable of operating on a profitable basis.

Indirectly, these discrepancies constitute problems which, along with other issues, comprise the list of basic faults which characterize the credit markets of Bangladesh.

First, the policy of maintaining low and heavily subsidized interest rates does not generate the necessary revenues to meet the system's operational costs nor does it encourage savings by the private sector. In addition, recovery rates on loans are very low, which contributes substantially to the cost structure of the credit system. Estimates vary, but as a general case, credit institutions have averaged only 37 percent recovery for loans within the due date, and some have been as high as 60 percent. Improvements have not been apparent, and, in some cases, there is evidence of deterioration.[49]

Secondly, administrative costs run higher than normal for efficient credit operations due to poorly trained personnel and the low volume of loan activities which lead to both high total and per unit lending costs. The low loan recovery rate and the high administrative costs together with an annual inflation rate of about 16 percent readily dissipate the real value of the lending institution's resources. One of the more realistic estimates argues for annual interest rates of about 24 percent, assuming loan recovery rates could be increased.[50] When compared with the highest current rates being charged by the credit system (12 to 17.5 percent annually), the level of the subsidy by the BDG and the importance of improved market structure and operation become obvious.

The low loan recovery rate and the high administrative costs seemingly arise from a common source, inadequate staff incentives and loan officer productivity.[51] Commonly, bank personnel are not adequately trained and suffer from deficient supervision and logistical support. These inadequacies are exacerbated by the pressures imposed by expanding loan activity, as has been the case recently. Moreover, the internal incentive system does not reward sound lending practices. Salaries are low which increases the vulnerability of agents to pressures to do "favors" which fall outside regular loan procedures.

Finally, the lending policies and procedures are not adequately structured to meet the needs of the small farmers and others in the sector who require agricultural credit but who do not own land. Most loans require land as security, an extended project analysis, and associated administrative processes. The loan security requirements effectively restrict the participation of tenants or other nonland owners. The complicated bureaucratic process involved in securing a loan from public agencies has limited the efficiency of the total credit system. Applications can take months for processing and require high time and travel costs which are significant for the farm populace. Application forms, loan terms, and regulations can all vary with the use to be made of the credit and the source of funds. These transaction costs are extensive and have a significant impact on the demand

for credit. The limited use of institutional credit is, in large part, explained by the negative response of borrowers to these high transactional costs. For example, it is estimated that in 1980 only about 32 percent of the allocated funds for the Special Agricultural Credit Programs were disbursed, and the 1981 projections were only for 75 percent.[52]

The inability of the credit system to sustain its financial viability is viewed with considerable concern by the BDG and most donors. The cost inefficiencies are but one side of the issue. The other concern is how to mobilize local capital in order to expand the total supply of rural credit and reduce the dependence of the system on subsidy. The subsidy to credit institutions is significant and competes for scarce BDG investment resources with other programs which are vital to the long-run future of agriculture. Elimination of the subsidy and the mobilization of internal resources are possible only if interest rate policies are changed to reflect a positive real rate which provides a meaningful alternative for savers. According to Adams and Graham:

> with more attractive incentives for savers, rural financial markets could mount major saving mobilization schemes in rural areas . . . Nominal rates of interest must be flexible so that they go up and down with inflation. Interest rate policies on both credit and deposits should be aimed at maintaining stable and positive real rates of interest.[53]

The BDG is being encouraged to structure agricultural credit in this direction. In 1982, an experimental project in rural finance, which tested some of the hypotheses associated with this concept of rural credit, was completed. Preliminary results, while not totally conclusive, are encouraging. They suggested that farmers will accept higher rates of interest and that private savings can be mobilized. Furthermore, loan recovery rates were high and transactional costs were reduced significantly.[54] A larger scale follow-on project will be initiated in late 1983, designed to bring these reforms permanently to the total agricultural credit system.

Land

Major land reform began in Bangladesh shortly after the 1947 partition from Britain, and most of the adjustments were completed prior to the conflict with West Pakistan. The landlord system, brought to the area by the British in 1873, was entirely set aside and the maximum size of ownership was eventually established at thirty-three acres.[55]

It appears that with these acts the government terminated much of its formal entrance into the land markets and

distribution system of Bangladesh. Today, land markets are open, and land can be traded without BDG interference, subject only to the land size restrictions. Other conditions, however, constrain the transfer of land. A cadastral survey was completed around 1938, but at the time of partition many of the maps were not transferred to Bangladesh. As a result, only parts of the country have proper mapping. The mauja (reference maps) have evolved from local initiatives as a substitute, but they are not totally complete for most areas. The history of conflicts and unrest in Bangladesh has resulted in lands being abandoned by emigrants, such as resulted from the War of Independence, without transfer deeds being executed. Sales have been allowed with only copies of deeds, which has encouraged multiple sales of the same piece of land and contributed to the growing confusion surrounding land titling. The court system has been unable to expeditiously adjudicate disputes. The land registration process and the system for resolving conflicts have become laborious, as a consequence, and legal transfers are being discouraged by the disarray and inefficiency.

Two interrelated trends in land sales are of concern to the BDG and donor agencies. First, there are pressures toward small farm sizes in Bangladesh as subdividing occurs within the family. Death of the father generally results in the division of already small holdings among surviving children. Legally, a father can "will" his property in any distributional scheme among heirs. However, in the absence of a prepared will, Islamic law requires that land be divided among all surviving children, with a daughter's share amounting to about one-half that of the son's. The trend towards greater numbers of small farmers is now accompanied by a higher propensity of small landowners to dispose of their land resources. Smaller farmers are said to lack "staying power" and, when faced with economic hardship, are forced to revert to land sale as a common solution.

Secondly, trends in land sales seem to corroborate this assertion as purchasers are more often those with larger land holdings. However, data are lacking to support the opinions concerning the magnitude of either family subdivision of property or size concentration resulting from land sales. One prior estimate provides some insights. For land exchanged between 1972-75, 60 percent of the land sold belonged to sellers who had average land holdings of less than 0.5 acres. On the other extreme, only 4 percent of the land sold belonged to people with average holdings in excess of 19.5 acres. From a separate sample of buyers in rural Bangladesh, less than 8 percent of the land purchases were by owners with less than one acre while as high as 86 percent of the transacted land was purchased by owners with five or more acres.[56]

There are no comparable estimates to assess the present situation in the rural areas of Bangladesh. One can only postulate that conditions have not been altered in a dramatic way

since the mid-1970s, which would present a new set of land exchange dynamics. Subdividing still occurs under the same Islamic law for all farmers, and smaller farmers are still less able to adjust to economic stress than larger ones.

Labor

There is a functioning agricultural labor market in Bangladesh. Wage levels are determined in local markets and tend to fluctuate as seasonal supply and demand conditions change. Market-related labor movement to meet seasonal employment needs is evident in many parts of the country. Wage rates are market determined. There are no indications of formal BDG interventions to influence the labor markets in agriculture. There appears to be few, if any, attempts by labor to organize either in general or within selected industries or commodity groups. Labor markets operate openly.

BDG participation in the affairs of labor are primarily in the nonagricultural markets and is centered in the Bureau of Manpower Employment and Training (BMET) within the Ministry of Labor and Manpower. Its interventions are largely to provide employment information and to conduct limited nonagricultural vocational training activities. The bureau also has supervised the export of labor to the Middle East, but, currently, discussions are in process to establish a totally independent entity for this purpose. The BMET has twenty-one employment exchanges with two branches, four youth employment offices, three apprentice training offices, and five training institutes. The training programs involve vocational study in a wide number of areas including mechanics, welding, drafting, electricity, plumbing, and woodwork, plus training for specific companies in such specialties as cable jointers, heavy duty equipment operators, diesel mechanics, and cooks.

The existing BDG infrastructure caters primarily to non-agricultural labor markets. There is very limited recognition of the need for formal BDG assistance in promoting employment within the agricultural sector. Even so, the numbers utilizing BMET services are small, and the overall impact on labor markets is not significant. For example, in 1978, 62,699 people registered with the employment exchanges. Most were semiskilled and unskilled, but about 2 percent held university degrees. Of the total registrants, 2 percent were placed in local vacancies and 10 percent were placed in foreign employment.[57]

Water

Markets for water are a somewhat recent phenomena in Bangladesh and are still in the process of evolution. Their emergence is a result of the increases in water development which have recently occurred. Wellowners oftimes find themselves with

excess water and have resorted to sale of water as an economic response. Consequently, sale and purchase of water are becoming commonplace in Bangladesh. Currently, there are no BDG controls of water sales. Water rights are established by drilling a well, and no further official confirmation is required. The water markets appear to operate freely. Prices are negotiated between buyer and seller. While potential monopsony power on the part of wellowners exist, there are no studies or other evidence to evaluate its importance.

Currently, there is no formal BDG intervention into the emerging water markets. Farmers are free to dig wells almost at will without prior approval or guarantee of water rights by a governmental authority. The closest thing to approval came for wells drilled by BADC, which were given prior clearance by a board of local government. Most privately drilled wells, hand pump operated wells, and surface water use are not subject BDG controls.

The development of irrigation water and the evolving market for its use are positive factors in the progress of the agricultural sector. Market forces appear to be doing an efficient job of allocating water to its highest use as well-owners are free to use the water to their best advantage within the farming system, and nonowners are free to buy or not to buy as negotiations dictate. So long as water is in sufficient supply, the system should operate with a high degree of efficiency and a minimum of disruptions.

However, the long-run implications of uncontrolled water development and use should be of concern to the BDG. Farmers are currently investing in irrigation development without security of use rights guaranteed by the BDG. Furthermore, usage is unregulated which can lead to important externalities as irrigation demands exceeds supply in individual areas--high usage by one person can eventually reduce water availability to neighbors. The interaction of deep tubewells with shallow tubewells in the same region may be especially suceptible to this type of externality. Early recognition of the issues and remedial efforts may eliminate significant conflicts from arising in the future which could deter water usage. However, care should be taken to guarantee that BDG interventions are minimally disruptive of present water development trends. Regulations should promote and not deter the present momentum and insure long-run viability of this valuable natural resource.

Government Provided Market Functions

The record of the BDG in providing general marketing needs such as price information and standardized weights and measures is mixed. It appears that too few resources are being expended

to properly develop these functions. Yet, they are most critical to the efficient operation of the marketplace, and only the central authority of government can realistically provide them. In fact, it is incumbent upon government to see that these functions are in place and operational if markets are to play an effective role in mobilizing agricultural resources.

Price Information

One of the more effective efforts of the BDG has been in providing price information, but the scope of the effort may still be inadequate to the market's needs. The Agricultural Marketing Directorate collects prices weekly from sixty-six district and subdistrict wholesale centers and daily from four major urban markets, i.e., Dhaka, Chittagong, Khulna, and Rangpur. In addition, the Food Ministry collects daily prices of paddy, wheat, and rice from sixty-eight subdivisional and district headquarters. They record the lowest price transaction daily. Farmgate prices are not routinely collected by any BDG entity. However, the agricultural wing of the BBS is currently testing a system for collecting farmgate prices which eventually could provide a nationwide sample.

Price information is broadcast twice daily from the Dhaka radio station. Additionally, major product prices are published daily in several Dhaka newspapers. Of course, the effectiveness of such programs is contingent upon the exposure of large portions of the population to the media forms used for transmitting the information. A limited number of Bangladeshis are likely to benefit from price information printed in newspapers due to both illiteracy and inaccessibility of the print. Radios, on the other hand, should be relatively more effective.

The system of price reporting in Bangladesh is not of recent origin which in itself speaks positively of the government's efforts. Price reporting in some societies has proven hazardous to the image of government's performance, especially when published prices begin to show rising trends.[58]

Market Regulation

The control of potential monopoly or other imperfect elements in the marketplace is part of the BDG overall marketing program. BDG interventions currently take the form of inspection of selling practices in local markets. Retailers, traders, and commission agents all are scrutinized periodically for improper selling practices. Commission agents are particularly vulnerable to checks since the Market Regulation Act sets maximum rates for commissions. The limited staff and resources of the Marketing Directorate plus the large number of markets in Bangladesh make adequate control impractical.

Weights and Measures

One of the major barriers to efficient market operation in Bangladesh is the hetrogeneous system of weights and measures being used. The current system of measurement originated centuries ago and have been altered somewhat over time. The hierarchy of weight units commonly used is the tola, chatak, seer, and maund. The most frequently used measure is 80 tola per seer. However, the measurements vary depending on whether purchase or sale is involved. Furthermore, variations are found both among products and between geographic regions (Table 4.10). For example, in Rangpur the number of tola per seer varies among thanas for the same product as well as among products. In Joydebpur, the number is different for sale than for purchase. A further complication is introduced by the type of apparatus used for weighing. While most weights are determined by balances, farmers often use various kinds of baskets and pots made of bamboo or clay. Jabbar and Mandal list as many as twenty different types, all of which vary in volume.[59]

A similar difficulty is found in land measurements. The acre is the most common, but twenty different units of measurement are used, some of them quite commonly.[60] Within each of these, variation also exists in the range of decimals used in the measures. For example, a katha has eleven different magnitudes in the measurement ranging from 1.5 to 10 decimals.

The lack of uniformity in measures and weights forces buyers and sellers in regional and national markets to constantly adjust to regional and commodity measurement differences. Furthermore, each agricultural product is likely to be measured in some of the different kinds of units. Of some consequence is the fact that Bangladesh was scheduled to change totally to the metric system in July 1982, but total adoption is not likely to occur rapidly.

Sanitation Control

Efforts to differentiate product quality or enforce sanitation standards are virtually nonexistent in Bangladesh. For example, there is no formal grading of meats or product quality differentiation for different cuts. Furthermore, there is no effective disease or sanitation inspection. Fruits and vegetables, likewise, are not subjected to formal quality inspection. The exceptions are found in jute and tea which are inspected and graded for export sale. Generally, the importance of product quality and sanitation has not been incorporated into BDG regulations as facets of the marketing system. Given the general lack of cold storage and refrigeration in Bangladesh, the potentials for food contamination are high. With the abundance of parasites and other pests, the ingestion of infected food could represent a significant source of disease and illness for the populace.

TABLE 4.10
Number of Tolas in a Seer for Purchase and Sale of Goods by Farmers in Selected Thanas, Bangladesh

Name of District/ Thana	Tolas in a Seer for		Remarks
	Sale	Purchase	
Dinajpur			
Nobabganj	80/60	80/60	60 for oil seeds.
Rangpur			
Sayedpur	80/60	80/60	60 for rice and jute.
Gongachora	90/80/60	80	90 for rice; 60 for paddy.
Mithapukur	90/80	90/80	90 for paddy in case of sale and 90 for rice in case of purchase.
Ulipur	90/80	90/80	90 for paddy and rice in case of sale and 90 for rice in case of purchase.
Gaibandha	86/80	80	86 for pulses and mustard.
Gobindogonj	80/60	80/60	60 for gur (molasses).
Bogra			
Sariakandi	84	80	
Bogra	80/60	80/60	60 for gur.
Pabna			
Kazipur	84/80	80	84 for jute.
Jessore			
Norail (1)	84/80	80	84 for rabi crops.
Norail (2)	82/80	80	82 for pulses.
Lohagora	84	80	
Bakherganj			
Kathalia	70	80	
Mathbaria	80/70	80/70	70 for rice.
Mehendiganj	82/63/82	80	
Dhaka			
Joydebpur	85	80	

Source: M. A. Jabbar, and M. A. S. Mandal, "A Survey in Weights and Hand Measurement Units Used in Bangladesh," **The Bangladesh Journal of Agricultural Economics** III(1):101-114, June 1980.

Note: Only parts of the table are included here.

Corruption

Any consideration of government's role in aspects of the market system and areas of intervention inevitably confront the potentials for graft and corruption. Where such conditions exist, they can distort the developmental process as readily as inappropriate policies or government interventions. As a general case, widespread existence of payoffs is an outgrowth ofover-regulation, inadequate pay for governmental employees, and a national attitude which sanctions such activities (at least those of the small office type) to the point that the actions become institutionalized into the fabric of governmental operation. It is seldom possible to measure the extent to which this problem exists in government, since it ranges from hidden acts to open demands and from small to considerable amounts of money. The

traditional appraisal of developing nations is that corruption is often widespread and detrimental to the developmental process. Bangladesh is no exception. Corruption in governmental offices is said to exist. Recent proclamations by the new Martial Law Government suggest that the problem is widespread and was a primary cause for military intervention into the process of civil governmental rule in Bangladesh. A campaign to eliminate graft and corruption has been announced.

Agricultural Cooperatives

Agricultural cooperatives have evolved to assist farmers to more effectively utilize both factor and product markets to their benefit. Fundamentally, the cooperative movement is an organizational response to economic conditions arising from a land tenure structure characterized by small farming units. Farmers with small landholdings cannot benefit from economies of scale either in the marketing of their products or in the purchase of production inputs. The cooperative umbrella is an alternative which attempts to obtain the advantages of size by converting individually small units into a larger collective organization.

The cooperative movement in Bangladesh was introduced in 1904 for the primary purpose of meeting agronomically related rural needs. Today, it is a large and complex organization. Evolution of the movement for almost seventy-five years has seen changes based on experiment and trial and error. The early organization of Village Credit Cooperatives was replaced by Union Multipurpose Societies in the midfifties and by the Village Agricultural Cooperatives in the sixties. Today, the movement is towards the IRDP type organization in the model of the Comilla project.

The Cooperative Credit Societies Act of 1904 authorized the formulation of a government level cooperative department. This office continues today and is responsible for assistance to the important sectors of the economy which are defined as agriculture, fisheries, small industries, and marketing.[61]

The cooperative societies are organized on a three tier basis: (1) Apex Cooperative Societies at the national level, (2) Central Cooperative Societies at the secondary level, and (3) Primary Cooperative Societies at the local level. A second system being strongly promoted under an IRDP scheme has a two-tier organization: (1) Thana Central Cooperative Association (TCCA) at the thana level, and (2) Krishi Samabaya Samiti (KSS) or local level agricultural cooperatives.

Cooperatives (co-ops) are organized in all major sections of the country. In 1981, there were thirteen Apex societies associated with 764 Central Cooperative Societies organized around nine different kinds of specialties. At the primary level, there were eleven major classes of societies involving 102,832 different organizations and membership totalling 6.5

million (Table 4.11). Of the total, 5.3 million members were associated with cooperatives related to agriculture. From 1979-80 the number of cooperatives grew by 4,617. The membership figures include those of the IRDP project, which total 35,661 KSS societies.

The co-ops cover a wide range of activities and specialities including credit, marketing, input purchases, milk, fish, sugarcane, transportation, training, and artesania. Special co-ops are also organized for women's activities.

The cooperative movement in Bangladesh since the 1960s has been heavily dominated by attempts to implement the IRDP Comilla model nationally.[62] The concept first came into prominence in the late 1950s when it was successfully implemented in Comilla. By 1968, the concept had been expended to most thanas in the district and has since been programmed nationally. The nominal growth was impressive. Between 1970-80, the number of TCCA increased from 33 to 267, KSS from 5,680 to 39,610 and membership totals from 136,000 to 1.3 million. Overall, 20 percent of all farm families in thanas covered by TCCA reportedly joined as paid members. In 1980, the total owned capital of the TCCA was TK. 92.5 million, which represented about 75 percent of the total capital in all co-ops.[63]

The IRDP co-ops have initiated program activities to supply assistance in obtaining: (1) irrigation equipment; (2) short- and medium-term credit; (3) fertilizers; (4) seed; and (5) training. The major emphasis has been in supplying short-term credit to members and the training of co-op officials and members. The organizational structure has proven somewhat useful in mobilizing farmer groups to encourage adoption of new irrigation technology such as drilling of deep tubewells. Finally, TCCA centers serve as media for diffusion of information. Regular training sessions are held for KSS chairman, managers, and model farmers. Through 1980, approximately 6,700 personnel at all levels had been trained by the co-op programs.

The membership profile for the KSS has been skewed in favor of larger landowners and includes minimal participation by the landless. Based on a survey of twenty-five TCCA, none of the co-op membership owned less than one-half acre. Twenty three percent held more than five acres. The lack of access by the landless and the general flow of benefits towards large landholders and the rural power elite has called into question the current value of the Comilla model despite its earlier success.[64] The inherent failure of supervision accompanying expansion of the project to a national base brought into focus the forces associated with rural class structure in Bangladesh. These events began in the early 1970s and have since progressed to the point where the present effectiveness of the co-op movement has been placed in doubt.[65]

TABLE 4.11
Total Agricultural Cooperatives and Membership in Bangladesh, 1981

Sl.	Type of Societies	Number	Membership (1000)
A.	**Primary Agricultural Societies:**		
1.	Union Co-op Multipurpose Societies	4185	1543
2.	Central Bank K.S.S.	40050	1132
3.	T.C.C.A., K.S.S. (IRDP)	35661	1869
4.	Fishermen's Co-op Societies	4281	536
5.	Sugarcane Growers' Co-op Societies	760	113
6.	Other Primary Agricultural Societies	1524	106
	TOTAL	86461	5299
B.	**Primary Nonagricultural Societies:**		
1.	Weaver's and Artisans Co-op Societies	3290	653
2.	Woman's Co-op Societies	2396	85
3.	Consumers' Co-op Stores	1602	131
4.	Youth Co-op Societies	3378	99
5.	Employees and Industrial Co-op Society	5705	259
	TOTAL	16371	1227
	GRAND TOTAL	**102832**	**6526**

Source: Cooperative Statistics and Research Organization, **Coopeative Movement in Bangladesh During 1980-81--An Interim Report**, November 1981.

The performance figures published on the cooperative movement are impressive, especially in trend. But the magnitudes of real participation levels and capital assets are not overly significant when one considers that cooperatives are often formed on paper to serve special interests, that existing co-ops do not necessarily mean active ones, and that numbers are as much illusory as real. The fact that co-ops in Bangladesh are often an arm of government through the IRDP presents at least one additional concern. By this organizational arrangement, they are subject to the inefficiencies which, at times, accompany governmental control. Successful cooperatives are most often economic entities whose success relies as much as anything on its business judgement, flexibility, and skilled management.

The impacts of cooperative organization in promoting agricultural development appears, at best, to be minimal. Cooperatives have not yet proven to be a substantive force despite the extensive membership lists and appearance of activity. There is little evidence of significant widespread changes or even pressures for change associated with cooperativism in Bangladesh which would lead to improved welfare of the rural populace.

Transportation and Communications

There is a recognized interdependency between physical infrastructure and regional economic development. Production of crops and manufactured goods in excess of what is needed locally add nothing to the economy unless they can be moved in an economical and expeditious manner to other domestic or international market areas. Likewise, production inputs must be transported to their geographical region of end use or they contribute little to the production cycle. To do so efficiently requires roads, motor transport, railroads, inland waterways, telecommunications, and air transport capability.

The Bangladesh transport and communications system is generally inadequate. Road travel is difficult and average cross-country auto speeds of only 25 mph are commonplace. The inadequacy of the system and the reduced ease and speed of movement has restricted the contribution of the transport sector to the nation's economy. In 1981, the sector accounted for only 6.1 percent of the total GDP (see Table 1.4).

The current state of the transport system reflects, in large part, the influence of the colonial economy prior to partition in 1947 which created a primitive base from which to initiate improvements. The colonial power saw the region primarily as a resource to be exploited, and railways and ports were strategically positioned and developed to facilitate export of selected agricultural commodities and to maintain the supply lines to the industrial centers in Calcutta.

The intervention of the BDG is extensive in the entire Transport and Communications (TC) system in terms of both regulation and operation. The establishment of a martial law government in 1982 brought the latest in a long series of organizational changes. Currently, all government TC organizations are under the Ministry of Communications. The Division of Railways, Roads and Highways includes the Bangladesh Railways Board (BRB), the Roads and Highways Department (RHD), and the Bangladesh Road and Transport Corporation (BRTC). The RHD is responsible for road construction and maintenance. The BRTC operates a public motor transport carrier system for

passengers and cargo. The public motor transport system, however, is much smaller than the private sector transport fleet.

The Port Shipping and Inland Water Transport Division has responsibility for traffic movement on the extensive river system of Bangladesh and encompasses two entities: (1) the Bangladesh Inland Water Transport Corporation (BIWTC), which operates the public-owned shipping enterprise, including both boat and ferry transport; and (2) the Bangladesh Inland Water Transport Authority (BIWTA) that functions as the BDG regulating agency for inland water transport by both private and public sector users. Its regulatory functions include setting fares for freight and passengers, establishing safety codes for roads and waterways, and controlling the importation of transport equipment.

The Division of Post and Telecommunications supervises the communication network of Bangladesh through two subunits: (1) the Bangladesh Post Offices (BPO), and (2) the Telegraph and Telephone Board (TTB).

There is considerable private sector participation in the total transport sector. Aside from the railway and airline system which are publicly owned, mixed participation is found in road and inland water transportation. At the present, there are no restrictions on private ownership and operation of conveyances on either roads or inland waterways, except that the maximum capital investment is limited to Tk. 100 million.

The surface transport system of Bangladesh must confront the difficult terrain created by numerous rivers and the limited land availability for road construction. The traffic patterns and use are determined largely by the nation's geography. Water transport dominates the movement of freight (Table 4.12). While the estimated cargo tonnage in 1979 was reduced from 1973, water transport still accommodated more than one-half of the total tonnage moved. Transport of cargo by road and rail has increased since 1973. Passenger transport has increased. Most people move by road with an estimated 50 percent using this mode of travel in 1979. Yet this share was down about 5 percent from the 1973 level while water transport of passengers was up considerably and rail transport has increased slightly.

Roads

The road system of Bangladesh is conditioned by the river system and the drainage geography. The natural drainage of the country is from north to south, so construction of east-west roads is expensive and must contend with the numerous rivers which impede travel in these directions. Heavy flooding requires high road embankments and good drainage which increases both construction and maintenance costs. All major areas are serviced by some class of road which at one point or another involves a ferry to cross the river when moving east to west (Figure 2). One estimate indicates that from 15 to 42 percent of the villages

TABLE 4.12
Passenger and Major Commodity Movements, Bangladesh, 1973 and 1979

	1973				1979				Annual Average Compound Growth[a]	
	Freight (mil. tons)	Proportion of Total (%)	Passengers (mil.)	Proportion of Total (%)	Freight (mil. tons)	Proportion of Total (%)	Passengers (mil.)	Proportion of Total (%)	Freight (%)	Passengers (%)
Rail	1.3	19.6	63.7	24.6	1.9	28.0	89.8	25.0	6.3	5.9
Road	1.1	16.2	143.0	55.3	1.4	20.5	178.8	49.8	4.2	3.8
Water	4.3	64.1	51.3	19.9	3.5	51.4	89.7	25.0	-3.2	9.8
Air	b	0.1	0.4	0.2	b	0.1	0.6	0.2	--	--
Total	6.7	100.0	258.4	100.0	6.8	100.0	358.9	100.0	0.2	5.6

Source: Government of Bangladesh, **Second Five-Year Plan, 1980-85**, May 1980, Table 15.1

[a]Estimated by least-squares trend line fit to annual data for the period 1973-79.
[b]Less than 6000 tons.

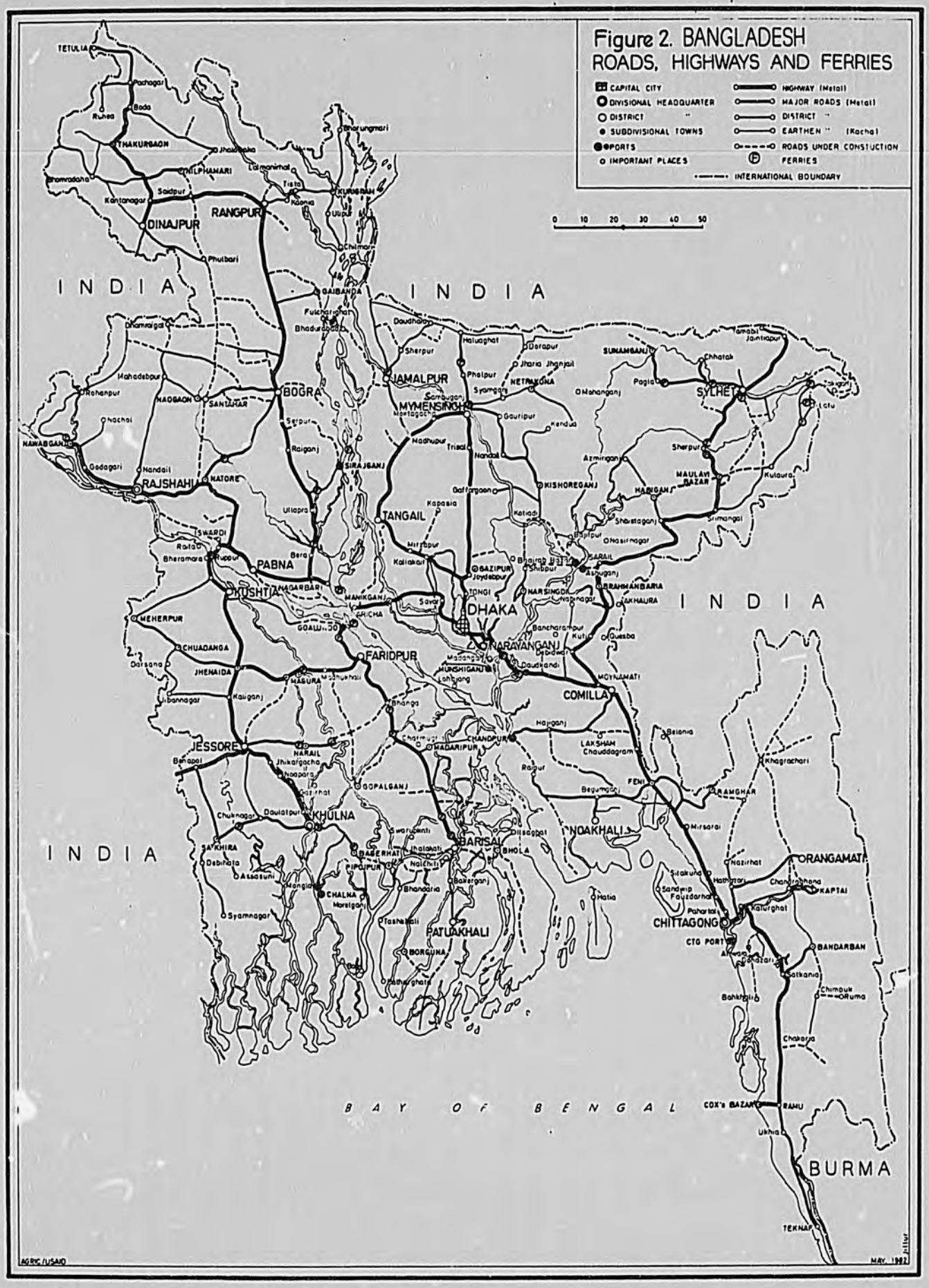
Figure 2. BANGLADESH
ROADS, HIGHWAYS AND FERRIES
CAPITAL CITY
DIVISIONAL HEADQUARTER
DISTRICT "
SUBDIVISIONAL TOWNS
PORTS
IMPORTANT PLACES
HIGHWAY (Metal)
MAJOR ROADS (Metal)
DISTRICT "
EARTHEN " (Kacha)
ROADS UNDER CONSTUCTION
FERRIES
INTERNATIONAL BOUNDARY
0 10 20 30 40 50
INDIA
INDIA
INDIA
INDIA
BAY OF BENGAL
BURMA
TETULIA
Pachagar
Ruhea
Bada
THAKURGAON
Jhaldanga
Lalmanirhat
NILPHAMARI
Saidpur
Kantanagar
DINAJPUR
RANGPUR
Tista
Kaunia
KURIGRAM
Phulbari
Chilmari
GAIBANDA
Fulchari
Bhadurabad
Mahadebpur
Rohanpur
NAOGAON
SANTAHAR
BOGRA
Sherpur
Raiganj
SIRAJGANJ
NAWABGANJ
Godagari
Nandail
RAJSHAHI
NATORE
Ullapra
TANGAIL
Kapasia
KUSHTIA
PABNA
Bera
Bheramara
Ruppur
MAGURA
MANIKGANJ
GOALUNDO
FARIDPUR
MEHERPUR
CHUADANGA
Darsana
JHENAIDA
Kaliganj
Jibannagar
JESSORE
Benapol
NARAIL
Jhikargacha
Noapara
Bhanga
GOPALGANJ
Chuknagar
Daulatpur
KHULNA
SATKHIRA
Debhata
Assasuni
Mongla
CHALNA
Morelganj
Syamnagar
BAGERHAT
PIROJPUR
Nalchiti
Jhalakati
BARISAL
BHOLA
Bakerganj
Bhandaria
Tashalati
PATUAKHALI
BORGUNA
Patharghata
Daudhandi
Haluaghat
Phulpur
Jharia Jhanjail
NETRAKONA
Mohanganj
Gauripur
Kendua
Madhupur
Trisal
Nandail
Gaffargaon
KISHOREGANJ
Katiadi
Mirzapur
Kalihati
GAZIPUR
Joydebpur
TONGI
Savar
DHAKA
Bhairab Bazar
Shibpur
NARSINGDI
Narayanganj
Bancharampur
Kuti
Quesba
NARAYANGANJ
Munshiganj
Lohajang
MOYNAMATI
COMILLA
Hajiganj
Chandpur
MADARIPUR
Rajpur
LAKSHAM
Chauddagram
Begumganj
FENI
Belonia
Khagrachari
RAMGHAR
Mirsarai
NOAKHALI
Hatia
Sitakund
Sandwip
Fouzdarhat
Patiarhat
CHITTAGONG
CTG PORT
Nazirhat
Hathazari
Chandraghona
ORANGAMATI
KAPTAI
Katurghat
BANDARBAN
Satkania
Chimbuk
Oruma
Bahkhali
Chakaria
COX's BAZAR
RAMU
Ukhia
TEKNAF
SUNAMGANJ
Chhatak
Pagla
SYLHET
Jaintiapur
Ladu
Sherpur
MAULAVI BAZAR
Kulaura
HABIGANJ
Shaistagonj
Srimangal
Nasirnagar
SARAIL
Ashuganj
BRAHMANBARIA
AKHAURA
Daudkandi
Lakshmipur
Bhola
AGRIC/USAID
MAY, 1982

(depending on the district) have access to a hard surface road within two miles distance.[66] There are reportedly 3000 miles of paved roads in Bangladesh.[67] Additionally, there are 25,000 miles of major unsurfaced roads and 33,000 miles of minor unsurfaced roads.[68] Most unpaved roads are poorly maintained and often impassable during the monsoon rains. The major part of the highway network (including the improved surface portion) is comprised of single-lane roads which are only about twelve feet wide. This quality factor, as much as any other, explains the slow rate of movement on the highways and creates highly dangerous travel conditions.

The use of roads in Bangladesh has been increasing. Trucks are operated both by the private sector and by the government-owned BRTC. In addition, the road transport system has a large segment of unorganized private carriers. These include rickshaws, pull carts, and animal carts (bullock and horse). The numbers in these groups are difficult to ascertain but their importance is obvious. One estimate by the Bureau of Statistics in 1979 attributes 42 percent of the value added by the Transport Communications and Storage sectors to the economic product to unorganized private road carriers. Interestingly, the unorganized water transport groups (family country boats, sampans, and others) contributed 32 percent.[69] These two were by far the most important transport groups.

The efficiency of the road transport system in Bangladesh is reduced somewhat by factors apart from the inadequacy of the physical features. First, there is a major traffic imbalance caused by the fact that import cargo to the rural areas is significantly higher than export cargo handled by the trucking segment. As a result, many trucks which haul to inland sites from the major seaports or urban areas return without a backhaul load which increases the costs of transport. The problem is exacerbated by the inadequacy of rural access roads to permit greater direct contact with primary markets. Most of the demand for motorized transport presently comes from arterial movement and very little results from outside limited areas off the major roads. The second five year plan estimates that of 971 growth centers identified at divisional, district, and thana levels, only 361 are linked by a paved road.

Secondly, road transport suffers from a system of tolls which impede movement and increase the cost of transport. The stations are operated by the Department of Roads and Highways, generally at locations where bridges or ferries have been built which initially required tolls to retire the indebtedness of the BDG. However, in many cases, the collections are continuing long after the facility cost has been paid. Reportedly, the Division of Roads and Highways operates 46 ferry stations (involving 175 ferrys) and 10 bridge locations where tolls are collected. The ferry toll payments are Tk.10 for trucks and large vehicles, Tk. 2 for cars and jeeps, and Tk. 1 for motorcycles and baby

taxis (small golf-cart type motorized vehicles). In 1982 (through February), total collections have been approxiomately Tk. 4 million. The monies are reportedly turned to the general treasury of the BDG.[70]

Rivers

The extensive river system of Bangladesh represents an important part of the total transportation structure and is of particular significance to the marketing of agricultural production. Water transport is the only form available to some regions of the country and, given the deficiency of road transport, represents the most efficient type in many others.

Navigable inland waterways are dependent on the runoff from the river system. About 5,250 miles are navigable in Bangladesh, but only an estiated 3,250 are available for year-round transport. The remaining 2,000 miles become useable during the rainy season of higher water flow. The primary types of craft which operate on the waters include about 2,400 launches, ferryboats, and passenger and cargo vessels which are both publically and privately owned. About one-third are non-mechanized. In addition, an estimated 300,000 unregistered "country boats" are used as family craft to transport both the people and products.[71] Among the nonmechanized registered craft are a considerable number of sampan-like barges which carry heavy cargo, sometimes up to thirty-five tons, and are assisted by attached sails. The publically owned BIWTC vessels total about 600 of various types, both for cargo and passenger hauling.

The interface of land and water routes in Bangladesh results in many places where road gaps occur which require ferry services for crossing. Currently, fifty-two gaps exist, with eight on national highways, seven on regional highways, and thirty-seven on district/feeder roads. An estimated 2.5 million vehicles of all classes use the ferry services annually on the fifteen national and regional highways. This represents an average use of 450 vehicles per day per crossing. On the thirty-seven district feeder crossings approximately 646,000 vehicles use the facilities annually which averages about forty-eight vehicles per day per crossing. Data on passenger crossings are not available but it is estimated that they are about twenty times greater than the number of vehicles.[72]

Railroads

The railway system of Bangladesh consists of two major north-south rail lines which total 1,786 route miles (Figure 3). About one-third of the railway route is broad gauge which services the Western and Northwestern parts of the country. The system extends generally from Khulna northwest through Jessore to Dinajpur and Rangpur districts. Elsewhere, the rail lines are

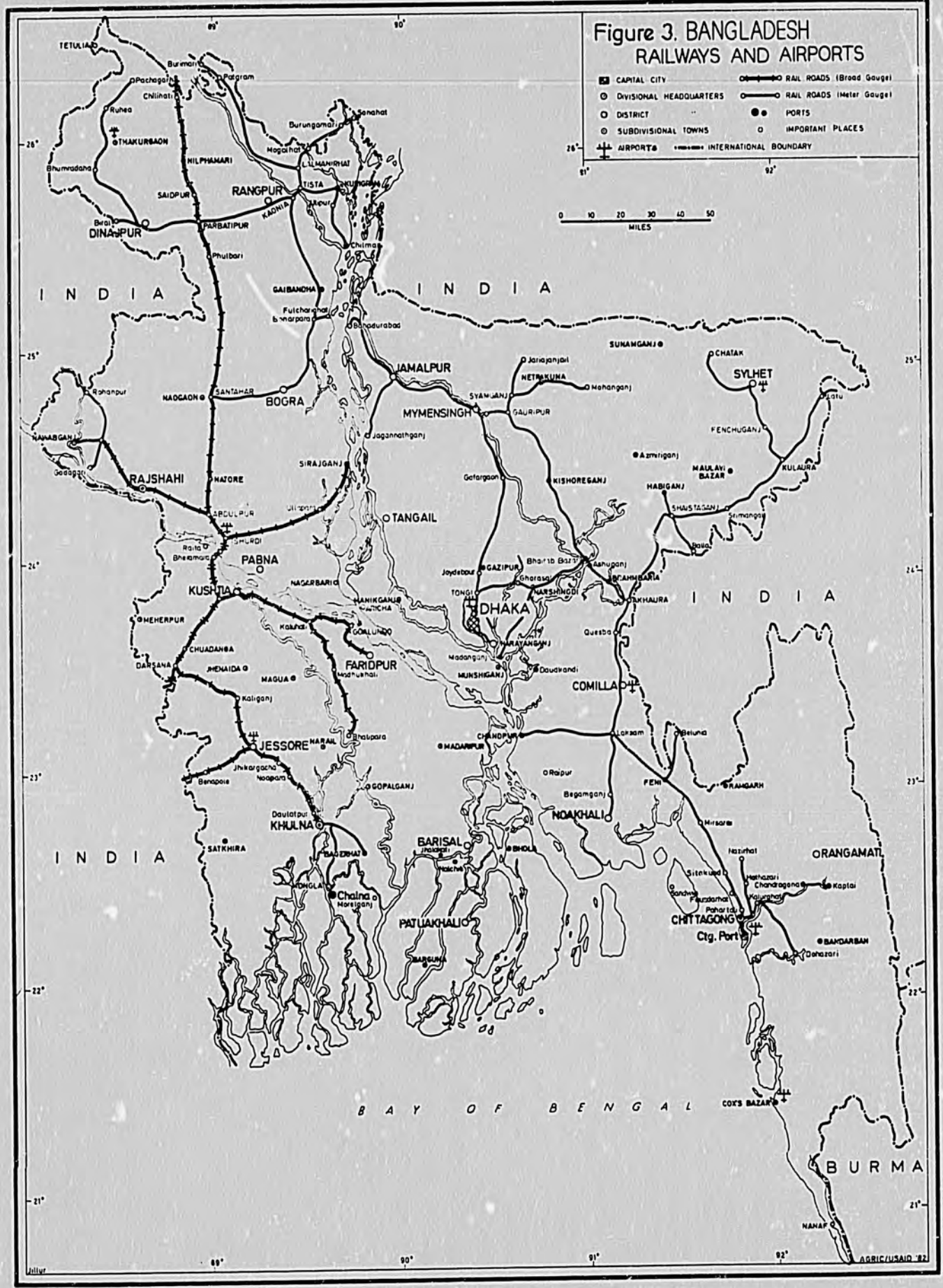
Figure 3. BANGLADESH
RAILWAYS AND AIRPORTS
CAPITAL CITY
DIVISIONAL HEADQUARTERS
DISTRICT
SUBDIVISIONAL TOWNS
AIRPORTS
RAIL ROADS (Broad Gauge)
RAIL ROADS (Meter Gauge)
PORTS
IMPORTANT PLACES
INTERNATIONAL BOUNDARY
MILES
INDIA
INDIA
INDIA
INDIA
BAY OF BENGAL
BURMA
TETULIA
Pachagarh
Ruhea
THAKURGAON
Bhumradaha
NILPHAMARI
SAIDPUR
RANGPUR
DINAJPUR
PARBATIPUR
Phulbari
Burungamari
Sonahat
Mogalhat
LILMANIRHAT
TISTA
KURIGRAM
KAONIA
Chilmari
GAIBANDHA
Fulchari
Bahadurabad
JAMALPUR
SUNAMGANJ
CHATAK
SYLHET
Jaintiapur
NETRAKUNA
Mohanganj
SYAMGANJ
GAURIPUR
MYMENSINGH
Jagannathganj
FENCHUGANJ
Azmiriganj
MAULAVI BAZAR
KULAURA
HABIGANJ
SHAISTAGANJ
Srimangal
Bajitpur
Gofargaon
KISHOREGANJ
Rohanpur
NAOGAON
SANTAHAR
BOGRA
NAWABGANJ
Godagari
RAJSHAHI
NATORE
ABDULPUR
SIRAJGANJ
TANGAIL
SHURDI
Rajia
Bheramara
PABNA
KUSHTIA
NAGARBARI
Jaydebpur
GAZIPUR
Bhairab Bazar
Ashuganj
BRAHMANBARIA
TONGI
Gharasal
NARSHINGDI
DHAKA
AKHAURA
MANIKGANJ
MANICHA
MEHERPUR
Kalukhali
GOALUNDO
NARAYANGANJ
Quesba
CHUADANGA
DARSANA
JHENAIDA
FARIDPUR
Madhukhali
Madanganj
MUNSHIGANJ
Daudkandi
COMILLA
MAGURA
Kaliganj
JESSORE
NARAIL
Bhatpara
CHANDPUR
MADARIPUR
Laksam
Belona
Jhikargacha
Noapara
Benapole
GOPALGANJ
Raipur
FENI
RAMGARH
Begamganj
NOAKHALI
Daulatpur
KHULNA
Mirsarai
SATKHIRA
BAGERHAT
BARISAL
Jhalakati
BHOLA
Nazirhat
ORANGAMATI
Sitakund
Hathazari
Chandraghona
Kaptai
Sandwip
Fatikchari
Kalurghat
Paharta
CHITTAGONG
Ctg. Port
BANDARBAN
Dohazari
DONGLA
Chalna
Morelganj
PATUAKHALI
BARGUNA
COX'S BAZAR
NAFAF
AGRIC/USAID '82

meter gauged and the system is generally found throughout the Eastern districts, mainly in Chittagong, Dhaka, and Sylhet. The Eastern system is linked to North Bengal via the Bahadurabad Ghat-Tistamukh Ghat ferry crossing of the Jamuna River. It meets the Western broad gauge system at Parbatipur and Santahar. The total system is mainly single track. In 1979 there were 486 stations.

The system is generally in disrepair. Reportedly, the rolling stock in 1979 consisted of 410 locomotives, 1,631 passenger coaches, and some 18,500 freight wagons. However, most were old and inadequately maintained. Lack of maintenance results in reduced carrying capacity and high operating costs. Likewise, signaling and switch equipment are outmoded. There has been no significant improvement in the system since even before independence. By comparison, in 1960 there were 1,712 miles of track, 472 locomotives, 1,175 passenger cars, and 16,000 freight wagons. At that time, the system was reportedly in poor condition.[73]

Despite the condition of the rail system, both tonnage and passenger traffic are said to be increasing. Ton miles reported for 1979 were 512,775, which is the highest to that date since 1970. Passenger miles of 3 million were second only to 1978.[74]

Air

Air transportation is publically controlled through the Bangladesh Biman Corporation. Its influence on the total movement of domestic cargo and passengers is extremely limited (Table 4.12). Domestically, there are ten airports with regular scheduled air service (Figure 3). Use of air facilities to ship agriculturally related products is extremely rare. The higher costs of air transport are beyond levels which can reasonably be accommodated by most of the agricultural sector. The accessibility and economy related to sea freight is far too advantageous to make air shipment a major alternative. However, limited amounts of vegetables and fruits are air-shipped to some Middle East countries.

Electrical Power

The electrical power system is administered by two BDG entities. The Bangladesh Power Development Board (BPDB) was established in 1972 with the responsibility for generating, transmitting, and distributing electricity throughout the country. The Rural Electrification Board (REB), created in 1977, has the responsibility for rural electrification. However, to date the REB is operating in only about 10 percent of the rural areas. The BPDB is still responding to electrical needs in a large portion of rural Bangaldesh.

The existing power system is divided into an eastern grid which feeds mainly Dhaka and Chittagong Divisions and a western grid which services the Divisions of Rajshahi and Khulna (Figure 4). The systems are currently separated by the Jamuna-Padma-Lower Meghna rivers but will be integrated into one national system with completion of the East-West Interconnector Project somtime in 1983.

The distribution network is composed of 1,146 miles of 132 KV transmission lines, 103 miles of 66 KV transmission lines, and 3,577 miles of 33 KV lines (Table 4.13). Besides cities and towns, electricity now reaches 385 of Bangladesh's 478 thanas (81 percent) and 1,724 villages (about 2.5 percent). The system services 596,958 customers in the categories of domestic, industrial, commercial, and agricultural. In 1980, the largest classes of users were industrial (63 percent), domestic (16 percent), and commercial (15 percent). Agricultural users totaled only about 2.6 percent.[75] Among the agricultural users, 6,905 pumps were serviced by electricity in 1982. This represents about 14 percent of the deep and shallow tubewells reportedly in operation.

Total generation capacity in 1982 was 857 MW, which is a relatively low level of electrification. Per capita production is estimated at only 30 KWH and only about 4 percent of the population benefits directly from domestic light and power. Of the total installed capacity, an estimated 90 percent is from thermal generation which is powered by natural gas and diesel fuels.[76] The rest comes from the Kaptai hydrogenerating plant in the Chittagong Hill Tracts. The natural gas sources used in thermal generation are located in the Eastern zone. The absence of gas in the Western zone forces reliance on imported petroleum which is a much higher cost and of considerable consequence to the nation's balance of payments. The aforementioned east-west connector will permit transmission of some amount of gas-generated electricity to the Western zone.

Despite the impressive growth statistics (Table 4.13), the electrical system is not yet adequate to the needs of Bangladesh and will become even less so as demand continues to escalate. Reportedly, both the installed and on-line capacities have been reduced in recent years as generating units have been retired without replacements.[77] Shortages are now apparent in most areas, especially during peak use periods and partiularly in the Western zone. Operational and management deficiencies are at the base of the difficulties, but of comparable importance is the high system loss of generated output. Reportedly, these losses total about 40 percent of gross generation, which is extremely high and puts added economic pressures on an already struggling system.[78] Technical system losses vary depending on transmission distances, system design, and materials but should not commonly exceed 10 percent under normal conditions.[79] The excessive losses found in the Bangladesh system are attributed primarily to

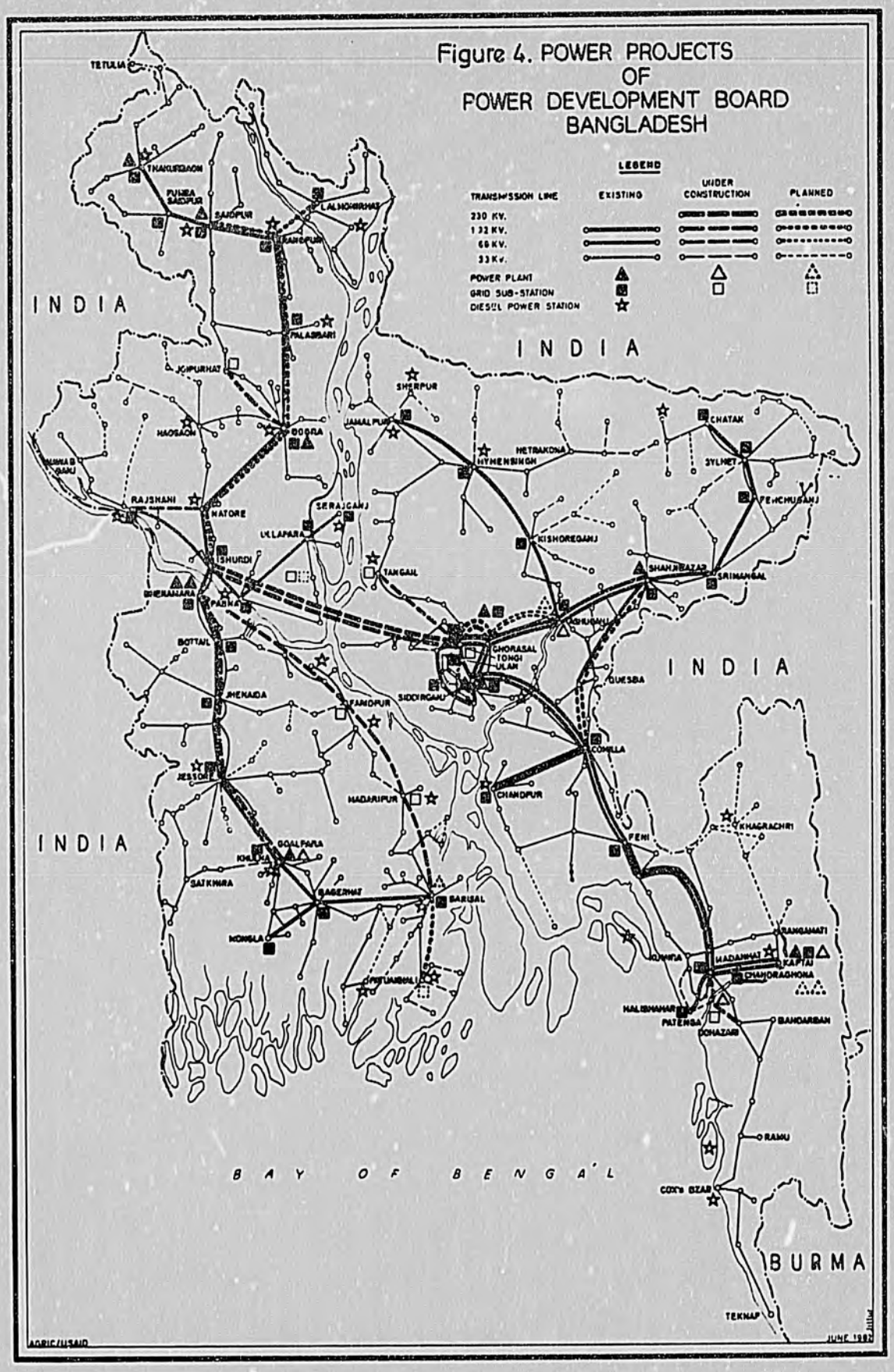
Figure 4. POWER PROJECTS
OF
POWER DEVELOPMENT BOARD
BANGLADESH
LEGEND
TRANSMISSION LINE
EXISTING
UNDER CONSTRUCTION
PLANNED
230 KV.
132 KV.
66 KV.
33 KV.
POWER PLANT
GRID SUB-STATION
DIESEL POWER STATION
INDIA
INDIA
INDIA
INDIA
BAY OF BENGAL
BURMA
TETULIA
THAKURGAON
PUBNA
SAIDPUR
LALMONIRHAT
RANGPUR
PALASBARI
JOYPURHAT
HAOGAON
BOGRA
SHERPUR
JAMALPUR
MYMENSINGH
NETRAKONA
CHATAK
SYLHET
FENCHUGANJ
RAJSHAHI
NATORE
SERAJGANJ
ULLAPARA
SHURDI
TANGAIL
KISHOREGANJ
SHAHJIBAZAR
SRIMANGAL
PABNA
BHUIGANJ
BOTTAL
GHORASAL
TONGI
ULAN
DUESBA
JHENAIDA
SIDDIRGANJ
FARIDPUR
COMILLA
JESSOR
MADARIPUR
CHANDPUR
FENI
KHAGRACHRI
GOALPARA
KHULNA
SATKHIRA
BAGERHAT
BARISAL
MONGLA
RANGAMATI
KAPTAI
CHANDRAGHONA
HALISHAHAR
PATENGA
COXS BZAR
BANDARBAN
RAMU
TEKNAF
ADRIC/USAID
JUNE 1987

TABLE 4.13
Electrical Power System and Distribution, Bangladesh, 1960-82 (Pre-Liberation)

Items	1960	1965	1970	1973	1978	1980	1981	1982
1. Generation (MW) capacity	88	202	475	545	752	822	813	857
2. Maximum demand (MW)	42	103	213	222	396	462	545	596
3. 132KV transmission lines (miles)	--	170	514	524	866	991	1114	1146
4. 66KV tr. lines (miles)	--	29	103	103	103	103	103	103
5. 33KV lines (miles)	12	400	1200	1515	2832	3105	3485	3577
6. 11KV & 0.4KV dist. lines (miles)	510	1700	3900	4500	7727	8875	10173	10680
7. No. of Thanas electrified	NA	NA	111	123	321	344	377	385
8. No. of villages electrified	NA	NA	250	300	1518	1675	1675	1724
9. No. of pumps electrified	--	NA	NA	551	1911	4406	6155	6905
10. No. of consumers	NA	104000	220000	277884	403518	522080	568411	596958

Source: Bangladesh Power Development Board, "A Brief on the Bangladesh Water and Power Board", mimeo report, April 1982.

illegal connections and theft by people securing electricity from unregistered connections. These losses, plus potential irregularities in reporting metered use and high noncollection of accounts receivable, make the system operate at a loss. In 1980-81, the net loss totalled Tk. 362 million plus a Tk. 100 million subsidy from the BDG.[80]

Communications

The telephone, telegraph, and postal systems offer a reasonable means of communication, given the resource constraints found in Bangladesh, but are inadequately developed by modern standards.

The communications system is BDG-operated under the Division of Post and Telecommunications. Telephone service is available in all major cities. In 1980, 116,506 telephones reportedly were connected in the country. Seventy-five percent were in the districts of Dhaka, Chittagong, and Khulna. Most telephones are located in the cities. For example, of the three districts just mentioned, 95 percent of telephones are in metropolitan areas.[81] In general, telephone service is available at the thana level but not normally to private customers. Access for the community is provided through lines to governmental offices. The exceptions are some thanas, which are trading centers and which may have direct private communications. International communications are facilitated by the earth satellite ground station at Betbunia in the Chittagong Hill Tracts.

Telegraph service is also available at the thana and district levels. In 1978, there were 793 telegraph offices located throughout Bangladesh, which is an average of about 40 per district.

The postal communications system is fairly efficient given the inadequacies of travel in Bangladesh. In 1980, 7,292 postal offices were distributed throughout the country, most of which were branches (5,822).[82] A postal facility is located in each union, and, in some, more than one facility is available. Rural carriers distribute mail between the thana and union offices. The postal facilities are commonly relied upon to transmit important papers, money, letters, and packages.

The infrastructure for the mass communications media in Bangladesh is reasonably well-developed through a composite of public and private ownership. Television and radio operations are BDG-controlled. There are six main radio broadcasting stations and two television channels with six relay ground satellites. The newspaper media is mostly a private sector initiative. Approximately fourteen major newspapers are published daily, of which only three are BDG-financed.

The impact of investments in these forms of communication on agricultural market efficiency is somewhat limited. First, a considerable majority of the rural population are illiterate,

which, together with limited access to newspapers, render newsprint a relatively insignificant media for promoting agricultural programs. Secondly, television is generally accessible only to higher income groups and reaches the mass of rural people very infrequently. The most effective media in reaching rural residents is the radio. Transistor radios are widely owned. The spread of ownership is assisted by the tradition of presenting wedding gifts of a bicycle, a watch, and a transister radio to young rural couples. With six strategically located broadcasting stations, radio reception is no problem in any section of the country. The effectiveness of the media depends mostly on the nature of the information transmitted. However, aside from a daily market price report and periodic "spots" concerning family planning, most of the radio programming is unrelated to agricultural issues and advisory services. Generation of effective agricultural programming and information requires some public investment to prepare appropriate and acceptable materials. This has not been done to date.

Summary

The agricultural marketing system of Bangladesh is a mixture of public/private participation. Governmental interventions in the marketing system are still extensive despite a shift in philosophy favoring increased private sector participation, which followed an early postindependence commitment to a highly centralized form of economic organization.

The government of Bangladesh has intervened in both factor and product markets for selected agricultural commodities. In the product markets, the interventions involve foodgrain (rice and wheat), jute, sugarcane, cotton, and tobacco. For the factor markets, governmental activities are limited to fertilizer, modern irrigation inputs, and credit. Peripheral regulations exist for land, but there are none for water and only a minimal information infrastructure for labor.

There is some inconsistency in the pattern of BDG intervention in the commodity markets. The foodgrain rationing system dominates product market controls due to its broad based impact and high subsidy costs. Foodgrains are distributed at subsidized prices to a wide range of recipients, most of whom are urban residents. Many in rural areas without access to agricultural lands generally secure their foodgrains in regular domestic markets at prices considerably higher than those of the rationing system.

The degree of governmental interventions in the product markets for jute, sugarcane, cotton, and tobacco is varied in intensity and impact. They range from fixing minimum grower

prices on selected commodities to import monopolies and varying export controls on other crops to a mixture of public and private ownership of processing facilities which again is not consistent among products. Other agricultural products of major importance have no formal governmental interventions.

Fertilizer sales and distribution are highly involved and subsidized BDG programs. A national system of BDG operated warehouses for fertilizer distribution is being restructured to centralize on about ninety primary distribution points. Many previous BDG restrictions on fertilizer movements among districts and dealer entry have been liberalized to permit more free market operations. Prices are fixed by the BDG but have been increased considerably in recent years to more closely approximate full cost pricing. Free market retail pricing was initiated in 1983.

The same philosophy is apparent in the markets for irrigation technology. Recently, BDG involvement has been reduced. Only the development of deep tubewells has significant BDG participation. Low-lift pumps are now being sold but at subsidized prices. The rental program is being phased out. Shallow tubewells are being developed at very near full cost prices. Hand pumps are now sold in markets and by BADC at subsidized prices. The current World Bank Imports Credit Agreement calls for phasing out all subsidies by 1985 to allow full private sector participation.

Credit has the full influence of the BDG since disbursal is entirely through the national banking system. The credit system is not viable and requires large governmental subsidies. Low interest rates combined with high administrative costs, low loan recovery rates, and inflation are primarily responsible for the insolvency of the agricultural credit system. Lending policies are oriented away from small farmers and the landless. Loans are tied to landownership, and the extensive administrative process causes high transaction costs. There is no focus on private savings and domestic resource mobilization.

Land markets are free of BDG input except for the limitation on size of holding. A 1938 cadastral survey is in place, some land and private holdings are legally described and titled. But, the loss of many of the cadastral maps at the time of partition has created immense difficulties.

Agricultural labor markets operate freely in establishing wage levels and are responding to seasonal needs. Minimal labor market infrastructure exists. Water markets are newly emerging in rural Bangladesh and as yet have been left free to establish prices and exchange values.

Government-provided price information is distributed daily by radio and in several daily newspapers. Formal market regulation activities are limited by the large number of markets in relation to available resources. Weights and measures are not standardized thoughout the country. Sanitation and quality control standards for agricultural products are minimal.

The current state of transportaion and communication infrastructure is not good. Rail and air transport are totally controlled by government. Road and inland water transport are a mixture of government and private participation. Most cargo moves by water and most passengers by road. There are only 3,000 miles of paved road in Bangaldesh. Waterways total 5,250 miles of which 3,250 accommodate year-round transport. The system of unorganized privately owned road and water vehicles, which includes cycle-rickshaws, pull carts, and small country boats, is the most important segment of the transport system. The communications system offers postal service to most unions in the country which is slow because of travel difficulties. Telephone and telegraph services are available in all districts but not always on an individual basis.

Footnotes

[1]Theodore W. Schultz (Ed.), Distortions of Agricultural Incentives (Bloomington: Indiana University Press, 1978).

[2]For one explanation of this phenomena see: J.K. Galbraith, The Underdeveloped Country, Canadian Broadcasting Corporation, 1965.

[3]Muhiuddin Khan Alamgir, Development Strategy for Bangladesh. Center for Social Studies, Dacca University, June 1980, p. 77.

[4]Just Faaland, and J. R. Parkinson, Bangladesh: The Test Case for Development (Boulder: Westview Press, 1979), p. 32.

[5]Reported in the Bangladesh Observer, April 19, 1982, p. 5.

[6]Government of Bangladesh, The Second Five Year Plan 1980-85, Planning Commission, May 1980, p. III-II.

[7]Ibid, p. III-4 and II-9.

[8]Based on personal interview with the Director of Marketing, Ministry of Agriculture, March 1982.

[9]Khandakar Rahman, The Experience of Marketing with Regards to Small Farmers in Bangladesh with Particular Reference to Comilla Rural Development Program, Bangladesh Academy for Rural Development, Comilla, August 1975, p. 5.

[10]Ibid., p. 5.

[11]Muhammad O. Farruk, The Structure and Performance of the Rice Marketing System in East Pakistan, Occasional Paper No. 31. Cornell University, June, 1970.

[12]Ibid., p. 35.

[13]Government of Bangladesh. An Annual Review, Ministry of Jute, 1977-78 to 1979-80.

[14]World Bank, Bangladesh: Recent Economic Developments and Selected Development Issues, Report No. 3768-BD, March 3, 1982, p. 299.

[15]A. M. Muazzam Hussain, and Md. Abdul Momen, The Jute Marketing System in Bangladesh, Bangladesh Agricultural University, Mymensingh, August 1974, p. 5.

[16]Ministry of Jute, Annual Report, p. 140.

[17]Bangladesh Institute of Development Studies, Rural Industries Study Project - Final Report, USAID, February , 1981.

[18]Henry Knight, Food Administration in India, 1973-74, (Stanford University Press, 1954); and Marcus Franda, Bangladesh: The First Decade, (New Delhi: South Asian Publishers Pvt. Ltd., 1982).

[19]World Bank, Bangladesh: Recent Economic Developments, Report No. 3768-BD, March 3, 1982, p. 286.

[20]Allocations for relief, food for work, and open market sales do not involve regular quota sales.

[21]Calculation adapted from that contained in Raisuddin Ahmed, "Food Grain Distribution Policies within a Rural Pricing Mechanism: The Case of Bangladesh," Reprint in Development Issues in an Agrarian Economy-Bangladesh, Center for Administrative Studies, Dacca, 1981, p. 102.

[22]World Bank, Report No. 3768-BD, p. 106. The "economic subsidy" as calculated by the World Bank values foodgrain imports at c.i.f. world prices, and domestic procurements at actual procurement cost.

[23]Ahmed, Foodgrain Distribution, p. 110.

[24]Ibid., p. 112.

[25]Stepanek argues essentially this same point. See: Joseph F. Stepanek, Bangladesh: Equitable Growth (New York: Pergamon Press, 1979), pp. 58-67.

[26]Ministry of Jute, Annual Report, p. 2.

[27]Bangladesh, Bureau of Statistics, Statistical Yearbook of 1980, p. 321.

[28]World Bank, Report No. 3768-BD, p. 255.

[29]Gur is a non-refined form of sugar which can be extracted from cane on the grower's premises with fairly simple equipment.

[30]The Gur control order was suspended in 1981 in the face of high cane production and pressures from growers who had no markets for their production.

[31]Dhaka Muslin is one of the world's oldest and finest cotton materials.

[32]Most of the information for this discussion is taken from: World Bank, "Staff Appraisal Report Textile Industry Rehabilitation Report," Report No. 3568-BD, July 27, 1981.

[33]USAID, Fertilizer Distribution Improvement, Project Paper Amendment, August, 1981, Annex B. 15.

[34]Information for this section is summarized from: USAID, Bangladesh Fertilizer Distribution Improvement, Project Paper, June, 1978, pp. 4-5.

[35]Summarized from: USAID Fertilizer Distribution Improvement, Project Paper Amendment, August 1981.

[36]Information supplied by Office of Food and Agriculture, USAID/Dhaka.

[37]An additional issue not explicitly recognized in either BDG or USAID reports relates to the distortions and misallocation of investment resources being promoted by the subsidy. This point will be discussed in a later part of the assessment. For a discussion of these problems see: Theodore Schultz. Distortions in Agricultural Incentives. Indiana University Press, Bloomington 1978.

[38]World Bank, Report No. 3768-BD, p. 106.

[39]USAID, Fertilizer Improvement, Amendment, p. 20.

[40]Cost estimates are from: Akhter Uddin Ahmed, "Diesel and Electric Power Pump Irrigation, A comparative Analysis." USAID, May 1981, p. 16.

[41]Information provided by Food and Agriculture Office, USAID/Dhaka.

[42]Ammann and Whitney. Final Completion Report: Small Irrigation Project, BADC/USAID, Part 7, p. 1, May 1982.

[43]For a more detailed description of the agricultural banking system and its problems see: World Bank, Agricultural Credit in Bangladesh, Report No. 3309-BD, September 29, 1981, pp. 325-

347. This summary draws heavily on the contents of the World Bank Report.

[44]Ibid, p. 327.

[45]USAID, "Bangladesh: Rural Finance Project," Project Paper Mimeo, (preliminary draft), April, 1983, p. 10.

[46]F. Tomasson Jannuzi and James F. Peach, Bangladesh: A Profile of the Countryside, Center for Asian Studies, University of Texas, 1979, pp. 130-131.

[47]Ministry of Land Administration and Land Reforms, The Study for the Development of Future Land Policy and Land Reform Measures in Bangladesh, 1978-1979, Dhaka, November 1981, p. 42.

[48]Interest rates of 10 percent per month or higher have been reported. See: Gary D. Adams, Experimental Approaches to Rural Finance in Bangladesh, Paper Prepared for Rural Finance Workshop, April 7-9, Kathmandu, Nepal.

[49]World Bank, Agricultural Credit, p. 328.

[50]This rate is being proposed by USAID under its new rural finance project.

[51]Gary Adams, Rural Finance, p. 10; and World Bank, Agricultural Credit, p. 333.

[52]Ibid, p. 330. Other contributing factors were the growth in 1979 and the floods in 1980.

[53]Dale W. Adams, and Douglas H. Graham, "A Critique of Traditional Agricultural Credit Projects and Policies," Occasional Paper No. 621, Department of Agri-Economics and Rural Sociology. The Ohio State University, June 20, 1980, p. 18.

[54]Gary Adams, Rural Finance, p. 5.

[55]The change process was very extensive. For an excellent, detailed review see: Abu Abdulla, "Land Reform and Agrarian Change in Bangladesh." The Bangladesh Development Studies. Vol. 11, Number 1, January, 1976, p. 67.

[56]Rizwanul Islam, "Trends in Income Distribution in Bangladesh," Development Issues in an Agrarian Economy: Bangladesh, Center for Administrative Studies, Dacca, 1981, p. 6.

[57]Government of Bangladesh, Bureau of Manpower and Training, Annual Report 1978, Undated, p. 5.

[58]An attempt to initiate a price reporting system in Bolivia in 1976, for example, was officially terminated. When rising prices were published this apparently embarassed the government even though the increases were normal seasonal changes.

[59]M.A. Jabbar, and M.A.S. Mandal, "A Survey in Weights and Land Measurements Units Used in Bangladesh," The Bangladesh Journal of Agricultural Economics, vol. III, No. 1, June 1980, p. 112.

[60]JABBAR and Mandal, Weights and Measures, p. 106.

[61]Information for this discussion is abstracted from: Cooperative statistics and Research Organization, Cooperative Movement in Bangladesh During 1980-81 - An Interim Report, November 1981.

[62]For a summary of the history and performance of the IBRD projects, See: Integreted Rural Development Program, A Joint Review by Government and the World Bank, January 1981.

[63]Cooperative Statistics and Research Organization, Coops in Bangladesh, p. 5.

[64]For one critique which makes this argument see: Harry W. Blair, "Rural Development, Class Structure and Bureaucracy in Bangladesh," Published in World Development, Vol. 6, No. 1, pp. 65-82, 1978.

[65]There is a growing dissatisfaction with the cooperative movement in Bangladesh. For some of the more insightful appraisals see: A. Jalil Khan "Whither IRDP-Cooperatives;" A.K.M. Aahirul Haque, "The Cooperative and the State;" M.M. Ahmed, "Need for Government Policy on Cooperatives;" and Akhter Hamid Khan, "Review of the Functions of the IRDP National Office and the TCCAs," all in Cooperation Quarterly Journal, July-September, 1979 and October-December 1979, Bangladesh Jayiya Samabaya Union, Dacca.

[66]Government of Bangladesh, Socio-Economic Indicators of Bangladesh, Bureau of Statistics, September 1981, p. 109.

[67]Government of Bangladesh, Statistical Yearbook of 1980, Bureau of Statistics, June 3, 1981, p. 512.

[68]Louis Berger Int., Rural Roads Study, Final Report, Vol. IV, February 1979, p. 24.

[69]Government of Bangladesh, Statistical Yearbook, p. 538.

[70]From personal interview with personnel of the Department of Roads and Highways.

[71]There is no accurate count of these small "country boats" which frequent every water tributary of Bangladesh. For one reported estimate see: Richard F. Nyrop, Area Handbook for Bangladesh, Area Studies of the American University, First Edition, 1975, p. 73.

[72]Rabiul Hoque, "Ferry Services Between Road Gaps in Bangladesh," USAID Mimeograph, Program Office, January, 1981.

[73]Government of East Pakistan, Transport Survey of East Pakistan, Vol. 1, 1961, pp. 8-9.

[74]Government of Bangladesh, Statistical Yearbook, p. 525.

[75]Bangladesh Power Development Board, Annual Report 1979-80, p. 36.

[76]World Bank, Report No. 3768-BD, p. 156.

[77]Ibid., p. 156.

[78]Bangladesh Power Development Board, Annual Report, p. 36.

[79]Information provided by USAID/Engineering Section.

[80]Bangladesh Power Development Board, Annual Report, 1980-81, p. 633.

[81]Government of Bangladesh, Statistical Yearbook, p. 529.

[82]Ibid.

CHAPTER 5
THE ROLE OF WOMEN IN AGRICULTURE

"The issue (of women in development) is not analogous to the rights of marginal populations, minorities, and other disadvantaged groups, but is one concerning half the total population of any country and their involvement in all spheres of life in the process of social and economic transformation."

Rounaq Jaban
Dhaka University

Introduction

Women occupy an important role in the agricultural sectors of most developing nations, yet it has only been in the last decade or so that the nature and significance of their contribution has been acknowledged in development planning. The information which has been assembled during this period presents a fairly consistent design of both the roles played by women and the various constraints they face as opposed to the male segment of the population. The specific tasks assigned to women are defined by the general role limitations placed on them in society and within the household. These tasks are accompanied by varying access to and control over resources which are of consequence to the output of the household. The assigned tasks also expose the female segment to an alternate incentive structure which has not always been recognized by development planners. Technical change can impact adversely on women's tasks either by elimination or alteration of their duties, and alternatives have not always been provided to compensate for negative effects as they occur. The nature of women's roles is traditionally modified from nation to nation by cultural, religious, and social conditions; but the existence of a structured scheme of roles and tasks based on gender is common in LDCs.[1]

Women represent a majority of the population in many LDCs. Many aspects of the production, processing, and marketing of food in these nations are among the important responsibilities assigned to women. The performance of agriculture, therefore, is affected by the capability of women and their response to new programs and agricultural technology. If the contribution of

women to increasing agricultural production is to be optimal, it is incumbent that steps be taken to insure that they are exposed to the new ideas and systems associated with modernizing the sector. This can best be done by understanding the specific roles women perform plus the dynamics of resource allocation and decision making in the household. The household unit is a unique system wherein consumption and production values are interrelated and compete for the limited available time and money resources. If the development process is to have a maximum impact, all available domestic resources within the household should be organized and brought into the change process. To pursue a developmental focus and strategy without concern for the contribution of women may be both wasteful and self-defeating--wasteful in the sense of potential loss of contribution from a segment of human resources and self-defeating because development, to be fully successful, should bring its benefits to as much of society as possible.[2]

Historical Basis of Women's Status

The traditional roles for women in Bangladesh have been so defined as to relegate women to the position of "docile daughter, compliant wife, and dependent mother."[3] Women in Bangladesh have been given lower status than men in every phase of life, both inside and outside the home. Within the family structure, a well-defined system places them continually under the jurisdiction of male authority throughout their lives. Women pass from the responsibility of their parents to that of their husband at marriage and to their sons if widowed. The traditional role accorded women has been upheld by strong social and religious beliefs.[4] For example, the Koran says, "Men have the authority over women because Allah has made the one superior to the other, and because they spend their wealth to maintain them. Good women are obedient."[5] Furthermore, women have not been associated with the authoritative structure of Islam nor have they been expected to participate, except in a peripheral way. Even today, they are excluded from the public meetings and rituals of the faith, although they engage in individual prayer.

Two principles of social organization characterize the status of Bangladeshi women: (1) the segregation of sexes; and (2) the dependence of women.[6] In large measure, these two principles and the structure of roles and activities assigned to women have been greatly influenced by the practice of purdah throughout the Muslim society. Purdah literally means "curtain" or "veil." The system advocates the seclusion of Muslim women from those outside the home and defines a strict code of female conduct. Strict practice means that a woman stays within the family compound and is not encouraged to make contacts outside the home.

If a woman leaves the compound, she must be veiled in a burkha (a garment covering the entire body).[7] Purdah is a basic tenant of Islam, but its importance arises not so much from its religious significance as from the way it affects the behavior and role patterns of women in Bangladesh and, particularly, those who live in rural areas.

Women in rural Bangladesh can be divided into three groups with distinctly different lifestyles.[8] The poorest are the destitute women who are generally divorced, widowed, or abandoned. These women must beg or seek work outside the household as laborers in order to support themselves and their families. A second group is composed mostly of the wives of small farmers, share croppers, and landless farm laborers. These women constitute a large majority of all rural women who usually work within their households or homestead and perform the traditional work roles. The third group is made up of wives of merchants, professionals, and large landowners. These women employ household servants, enjoy leisure time, and are usually the most educated.

One of the most distinctive, traditional signs of status in rural Bangladesh is the behavior of women in the family. Appropriate behavior for women includes strict purdah and complete sexual division of labor. The practice of strict purdah requires extra expenditures to establish appropriate facilities within the house that guarantee separation and to purchase the special clothing. In addition, it has an alternative cost of income or other home benefits which are foregone by its strict practice. Only the upper income families can afford to support the strictest form of purdah, and this economic limitation excludes the two lower rural classes described previously. But, because it is such a strong status symbol of both influence and economic welfare, most families aspire to reach the highest levels possible. As a consequence, the behavior of rural women related to the tenants of purdah vary considerably. For a large majority, the strictness of the system has been relaxed by circumstance.

Still, the general limitations on the mobility and status of women engendered by purdah go a long way in explaining the roles which have been defined for them in Bangladesh society. The household or homestead has been identified as their domain. Heavy demands have been placed on women for childbearing and their consequential roles have been limited to family and homestead-related activities. Women's principal source of prestige and security has been derived from bearing children, primarily male descendants. Male babies are accorded a significant preference in the hierarchy of values, even to the point of preferential nutrition and medical care relative to their sisters. Among rural women, the system has been reinforced by precedent, and they have been locked into their traditional

roles from birth. Their social, legal, and marital status and rights have all been defined by the system.

The strictness of the system, however, is being challenged by circumstance and social change which are weakening some of the basic pillars. Change is more apparent in urban areas, but even in rural regions alterations are occurring. For example, while poverty reinforces the structure in some rural households, it is a force for change in others. The divorced or abandoned groups of rural women who are forced into the job market outside the home by economic necessity cannot comply with the strict purdah code. These women have no choice but to seek employment where possible, and this takes them outside the home and places them in contact with men. Even though these women are accorded greater social inferiority than most, the fact remains that the process is having its impact on the rigidity of the system. Among other rural classes, women are being forced into factories, fields, and the homes of the more affluent to find the means for existence. Many of those found in Food for Work projects, for example, are landless, divorced, or abandoned women. Others come from economically disadvantaged homes. Even among middle and upper class women in both rural and urban areas, economic stress is causing changes in attitudes toward outside employment and limiting the degree to which the practice of strict purdah is followed.

A further influence is the exposure to western education and life styles, especially among the upper urban classes. Women in these groups have been able to discard the outward symbols of purdah. Generally, these women do not use the burkha, and their mobility has been increased rather than decreased.[9] In the case of the more affluent, the greater freedoms are seen as evidence of higher social status.* The underlying principles of purdah are still accepted, but its practice has been altered. The rigidity of conduct and the limitations on movement have been lessened considerably since independence, particularly in very recent years.

The social and cultural barriers which disadvantaged rural women face in attempts to gain entrance into the economic system are formidable; but they are perhaps less so than some of the inveterate and unyielding attitudes which led to stereotyped descriptions of women and their capacity to contribute to societal betterment. Several of these have been categorized as myths in the following way: (1) women in Bangladesh do not do economically productive work; (2) a woman's role in Bangladesh is predetermined and static; (3) if women are encouraged to work, this will add to male unemployment; (4) women necessarily benefit

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*Interestingly, among the rural poor, similar freedoms are accorded extreme social inferiority.

from development programs directed toward men; (5) programs for women should be directed exclusively toward their roles as mothers and homemakers; (6) women are too busy to take on additional activities; and (7) women in Bangladesh are helpless and ignorant.[11] Experience and evidence would refute or significantly alter these characterizations of Bangladeshi women.

Women and Education

One of the most pervasive impacts of women's status in Bangladesh is reflected in their lack of formal education. Bangladesh has a low overall rate of literacy (22.2 percent), but women are much worse off with only 13.7 percent literate compared to 29.9 percent for men.[12] The low level of primary school enrollment is responsible for the low literacy levels among females. "Out-of-school" percentages for females who normally should be in primary school are much higher than males. Similar relationships exist in the secondary schools as well.

The low level of female participation in formal schooling is an extension of the status issues found in Bangladesh. Where household income is limited, boys are accorded preference in most activities involving expenditures. Furthermore, girls are an asset in large traditional families. Girls begin filling the "helper" role around five years of age, at a time when they should be starting school.[13] Young girls commonly engage in such activities as tending animals, collecting firewood, carrying water, child care, washing and cleaning. As they become older, they assist in threshing, boiling, and drying rice and other more demanding domestic duties. The prolonged cycle of childbearing found in large families defines an extended period of need for help in the home and deters primary school participation. Purdah does not seem to directly limit enrollment during primary years, but it does influence the quality of education for girls who attend school, since female teachers are in extremely short supply. It is estimated that only about 5 percent of the total primary/secondary teachers are female.[14]

The importance of income, however, is a basic constraint to female enrollment and is the theme of a USAID-supported pilot study for secondary school children in five unions within Comilla district. Parents receive a Tk. 120 quarterly scholarship to offset the costs of school attendance for female children.[15]

The influence of sex roles is seen as an additional deterrent to school attendance in the secondary schools where coeducation often occurs at an age when the practice of purdah initially begins. All-girl schools, where they exist, are mostly in urban areas. With no alternatives, motivated girls must either attend coeducational schools or drop out.[16] Furthermore, the cost of education escalates in the secondary schools since most schools

are privately administered with some BDG subsidy. A final barrier and critical inconsistency is found in the course options for girls. The agricultural options are for boys only, despite the considerable involvement of females in agricultural processes. Only a traditional home economics option is available for girls, nominally described as vocational training. Furthermore, the system offers no programs for training girls in agriculture or industrial arts as the basis for increasing the supply of female teachers with competence in these disciplines.[17]

University education is even less available for women than the earlier years for most of the same reasons. Large numbers are eliminated from the educational system by the costs and the social pressure of gender-determined roles, and they cannot qualify for university admission. For most, higher education has been looked upon by some as deviant behavior from the traditional norms of the society.[18] However, an estimated 10 percent of the students enrolled in the universities in 1980 were women (Chapter 8), which suggests a changing trend. Even so, most females in the university come from urban upper class families and hardly any from rural households.

The deprivations imposed on women by the lack of educational opportunities are significant in terms of both economic and social welfare. So many options are lost to them both inside and outside the household from lack of training. But a factor of priority importance is the impact education has on fertility and family planning. Higher levels of education have been demonstrated worldwide to be positively and significantly correlated with reduced fertility and family size.[19] Similar demonstrations have been made in Bangladesh.[20] Education and fertility are intricately related to many social, economic, and psychological processes which give rise to a new set of values and circumstances of consequence to population planning. The evidence is compelling and, as much as any other single factor, demonstrates the need for insuring higher participation in formal education by the female segment of Bangladesh's population.

Women in Nonagricultural Employment

The activities of women in the nonagricultural sectors are determined, in large measure, by poverty and the widespread practice of female isolation. In rural areas, their tasks are restricted mostly to the household, and few venture outside for nonfarm work unless poverty and adverse circumstances dictate. (The nature of women's roles in the rural household is discussed later.) Urban women engage in most of the nonagricultural work. In large part, the jobs found appropriate for women have been defined in terms of the amount of contact required with men. But, in addition, the denial of adequate educational

opportunities, which has been inherent in the segregated system, has left many women without prerequisite skills; and they are ill-prepared to qualify for employment in many occupations.

The system has created several divisions of labor which are not typically found in other countries. Trade and retail sales work is still almost exclusively male-oriented in contrast to other nations, such as those of Latin America, where women dominate the marketing sector, especially for agricultural products.[21] In these nations, women control most of the retailing functions for agriculture and more than a proportionate share for other items. Many possess highly developed entrepreneurial skills. An inordinately high proportion of Bangladeshi secretaries are still men, which reflects both the frequent interactions this profession has with male associates and an absence of female skill training. School teachers are also mostly men, which is indicative of training deficiencies and the social difficulties women often encounter in teaching coeducation studentbodies found in most villages. Nursing, a traditional women's role elsewhere, was initially male-dominated in Bangladesh since its nature was said to violate the basic conditions of purdah.[22] However, in recent years, more and more women have entered nursing and likely now dominate the profession. Medical training for women doctors has always been advocated, and some urban women have entered the profession. Women, practicing strict purdah, are not allowed contact with male physicians, even at the expense of foregoing medical treatment; and the need for women doctors is seen as a response to support these women.

In many areas, the practical needs dictated by poverty as well as some degree of social evolution are causing changes and breakdowns in these traditional nonagricultural work roles. More and more women are becoming secretaries and nurses, and some are occupying important positions in public administration. At present, one woman is a minister in the BDG. A number of women occupy scientific positions in agricultural research institutes. About 150 women have been trained by the extension service for posting in rural regions. Women fill secretarial positions in government as well as professionally oriented staff jobs such as researchers in ministry planning units. Women are permitted to enter the civil service, although only a very limited number do so and hardly any who come from rural areas. Very few have been elevated to top management positions in the private sector, except in those rare cases where they may operate their own business; although increasingly, females are being employed as bank tellers and retail clerks.

Attitudes, in general, seem to be changing and women are more and more willing to work outside the home, especially in urban areas. In a 1977 survey of 548 nonworking women in Dhaka, 72 percent expressed a willingness to accept outside employment if offered. The main reason was economic stress in the home.[23] No

similar survey is available for rural women, but one could hypothesize that a high percentage of the destitute rural women would respond positively to work opportunities outside the home, while rural married women with less drastic economic pressures would be less inclined to break with tradition by working outside the home.

Women and Politics

Political activity by women has been mostly an urban prerogative, but the right to participate in politics is established for all women by the constitution of Bangladesh. However, the social position of women has retarded their exercising of this right. The legislative system specifically reserves 30 seats in the 330 seat parliament exclusively for women. Other seats also may be contested by women but seldom are. Of course, the fact that martial law has prevailed in Bangladesh for several years of the nation's young existence means that the legislative branch has not operated and, consequently, women's participation has been curtailed. Women who have held legislative responsibilities have generally come from the urban elite rather than rural families. In the first national election held in 1973, an estimated 10 percent of the voters were women, but the participation rate was considerably higher among urban than rural women. During that election, two women successfully contested general parliamentary seats.[24]

There is a general absence of politically active organizations which are promoting the causes of women in Bangladesh. In 1976, a Division of Women's Affairs was established and later elevated to ministerial rank, headed by a woman as minister. In the most recent BDG consolidation, the Women's Affairs Ministry was continued and is still headed by a woman. One joint secretary position is also filled by a woman. Several national women's organizations, such as the Bangladesh Jatio Mahila Samity, The National Federation of Bangladesh Business and Professional Women, the Bangladesh Women's Association, and the Bangladesh Women Rehabilitation Foundation, are promoting programs dealing with women's issues.

Historically, the involvement of women in the politics of Bangladesh has been minimal. Their ascension to roles in government has represented token appointments. Still, the present government has taken, publicly, favorable positions on the need to elevate the status of women in the society. There appears to be an undercurrent of a more liberal perspective of women's status, especially in the urban regions. Social movements often generate their own momentum once in motion and the longer run alterations in women's political involvement may become more significant.

Women in Agricultural Development

The influence of purdah and the restricted mobility of women have provided the basis for a clear division of labor between men and women in rural households. Men primarily engage in production and marketing activities. Women engage basically in homemaking, the postharvest processing of crops, and care of the products which can be produced from the homestead lands. The home and homestead are the domain of women. Their influence is especially apparent in three primary areas of the household, i.e., agricultural production, family welfare, and decision making.

Agricultural Production

A woman's most important responsibility associated with the production of agricultural crops is caring for all postharvest activities associated with grain production.[25] She does no field work with the men. Threshing grain is a man's job, but the woman prepares the threshing floor and is responsible for proper drying, winnowing, and storage of the rice. Parboiling (a process of steaming to get a higher return of rice per unit of paddy) and husking also are done by the woman. Aside from rice, the homestead production of horticultural products is entirely under the stewardship of the wife, except in cases where fruits and vegetables are commercially produced in the fields. A wide range of vegetables, fruits, and spices are grown on homestead lands. The woman prepares seedbeds and plants, cultivates, waters, and harvests these crops. It is her job even to stand night vigil when crops are ready for harvest and theft potentials increase. She also must preserve spices and other storable items for future use.

Small animals and poultry production also fall to the responsibility of the wife. Chickens, ducks, and pigeons are given high priority in the household due to the by-products which can be used to generate cash. Women without poultry are often given lesser status. Milking, watering, and feeding cows, bullocks, and goats are also a woman's chore. Goats are generally tended by elderly members of the household. Fishing is a man's responsibility, but, increasingly, women are participating in fish production schemes using fish ponds established on or near the homestead.

Family Welfare

A woman's primary task is to bear and raise children. Most of her status arises from these activities, particularly for male children. Meals are prepared thrice daily, and one meal normally

must be delivered to the men who work in the fields. Time also is spent preparing rice in various forms (such as boiling or powdering) for special dishes. The woman also is responsible for collecting fuel of all types for household burning. Wood, leaves, cow dung, and rice hulls are the most common. Many engage in handicrafts, especially during the monsoon when more time is available. Most are for household use, but in areas where a handicraft tradition exists or if the woman has special skills, she will market some of the products. There are villages in Bangladesh which specialize in handicrafts or other income-producing activities and the woman participates closely with her husband in the production process, i.e., oil crushing, pottery, weaving, and fishing.

The housewife is generally fully occupied, despite the fact that children and older members of the extended family often assist in some tasks. A typical rural woman's daily timetable has been described as follows:

5 a.m.	Rising, washing and cleaning the house and compound, releasing the poultry, collecting eggs.
6-7	Preparing the early morning meal for theworking members of the family before they go out to the fields.
7-8	Milking, collecting fuel, making dung cakes, tending kitchen garden, cleaning cowshed and compound, drying straw to burn.
8-9	Preparing food for the midday meal, grinding spices, peeling vegetables.
9-11	Husking paddy, winnowing and sifting, preparing rice products.
12-1 p.m.	Washing clothes, bathing, fetching water, feeding animals and the poultry.
1-2	Drying jute and paddy, putting other stores out in the sun to dry.
2-3	Feeding her husband and family; after this eating herself.
3-4	Preparing and cooking the evening meal.
5-6	Praying, bringing the children home, shutting up the poultry and animals.

6-7 Eating the evening meal and cleaning up.

7-8 Rest period, sitting on the verandah talking and smoking before going to bed.[26]

Decision-Making

The segregation of labor within the household leads to a certain amount of independence in decision making by women, but the interdependence of production and consumption in the home keeps the decision process from becoming totally uncoordinated. The husband appears to dominate decisions regarding land purchases, major crops to be planted, location of plantings, input use, and credit acquisition. For the most part, the husband controls the money resources of the household. The wife, on the other hand, has fairly exclusive decision rights with respect to subsistence horticulture and animal husbandry, food processing for human consumption, food preservation, and the manufacturing of household items and handicrafts. Collaborative decisions occur more frequently for matters affecting family welfare such as selling assets, food needs, and education. Both man and wife have independent access to credit, and the woman can be a member of special cooperatives developed for women's needs.

The marketing of agricultural products is essentially a male-dominated activity. All the major functionaries (dalals and beparias) in the marketplace are men. Decisions regarding sale of surplus field production and regular cash crops are normally made by the husband. The wife has some dominion over the marketing of the products she controls, but the restrictions on her mobility and participation in the marketplace limits the effectiveness of her authority. She must rely on middlemen who are usually her husband, sons, or other family members or sell directly to merchants who come to the farmgate. She is often exploited in the process. Income generated from her activities over which she can gain possession is generally hers to control. Given the restrictions on her participation in marketing and her forced reliance on middlemen, gaining possession of money from her efforts can be difficult. Nevertheless, the funds she does control often represent the major cash savings of the rural household. Memberships in cooperatives are often favored by women since co-ops offer a safe place for their money which is accessible only to them. Interestingly, women periodically withdraw their money and then redeposit it shortly thereafter as reassurance that their money is safe and will be delivered on demand.[28]

In response to the severe economic stress faced by many rural families, a woman will often seek other means to supplement the household income. Storing rice at harvest and holding for later sale (sometimes without the knowledge of her husband) is a common and sometimes effective method of speculative earnings.

Accumulations of rice can become significant by setting aside a handful (called musti) now and then as a systematic system of forced savings.

The consideration of rural women's role in agriculture to this point has had the family unit and landownership as its basis. Yet, there are other groups of terribly disadvantaged women who own no land and must rely on work opportunities to support themselves and their children. These women are forced by necessity into roles and activities which violate the basic premises of purdah. Fieldwork and household work for others are among the common responses. Some of the most destitute have entered the FFW programs to engage in earth-moving work for wheat. Most are indigent. Some pay a high price in family conflict and social disapproval in order to enter these new roles, but, for the most part, both family members and neighbors are not highly critical of women working in FFW projects where needs dictate. A 1981 survey revealed that only 8.2 percent of the workers' families and 18.6 percent of their neighbors were highly critical of them for working outside the home.[29] For most, the choice is to accept these jobs or to starve.

Organized Programs for Women

The period since independence has seen a growing awareness of the problems faced by Bangladeshi women. Efforts have been initiated to ameliorate conditions and to incorporate women more fully in developmental efforts. The war in 1971 produced conditions which in a tragic yet subtle way affected the status of women. The BDG officially addressed the plight of distressed women who were widowed or who otherwise suffered at the hands of the Pakistani army by creating the Bangladesh Women Rehabilitation Organization. Rehabilitation centers were established nationwide for these women, and, although the need has since diminished for rehabilitation, the organization has taken on expanded programs in vocational training.[30] Since this beginning, there has been a mushrooming of organizations which provide assistance to women in Bangladesh.

A 1980 census of women's organizations in Bangladesh by UNICEF identified 214 which could be considered actively operating with assistance.[31] Forty-two additional organizations formally registered following the closing dates of the census. Most of the organizations focus on skill training and adult literacy. Of the initial group, 85.5 percent were private organizations, 13.1 percent were BDG-sponsored, and 1.4 percent were supported by international agencies. Most of the organizations have multiple objectives, but programs to provide economic benefits were the most common (26.8 percent). Training (18.5 percent), adult literacy (17.3 percent), women's leadership

(14.4 percent), other developmental programs (11.7 percent), and cultural activities (11.3 percent) were the other activities. Among the varied sources of support for these programs, direct BDG assistance amounted to only 18.6 percent of the total received. Subscriptions and sale of goods were the most important sources of assistance. Of the women attending programs at the time of the study, 39.8 percent were distressed or landless, 32.2 percent came from the lower middle class, and 16 percent from the middle class. No upper class women were in training.

The locations of the women's organizations were not clearly identified, but the list suggests that they are mainly concentrated in urban and suburban areas. No evaluation of programs or their effectiveness was undertaken. However, the issues of program relevance and whether they reach target clientele are continually raised. Shamina Islam, a prominent Bangladeshi scholar, makes the following observations:

> The major efforts toward non-formal education for women in Bangladesh overlook the clienteles' existing economic and socio-domestic roles, and instead of attempting improvement of the present level of knowledge and competency of rural women, they are trying to initiate new roles for women through varieties of skill training programs which clearly demonstrate preconceived notions and urban biases. Moreover, apart from the initial supplies, the problems of funding necessary inputs and creating a marketing channel have been the major deterrents to the success of these programs.[32]

The accuracy of such criticism of existing programs depends on the clientele being trained. Landless, abandoned, or widowed women, who have no other base from which to derive income, need new skills or other options from which to generate family support. To a large extent, this class of need has been serviced by existing programs, although their effectiveness is unclear. The other clientele who can benefit from women's programs is the rural housewife whose life and productivity are embodied in the homestead. New roles are not usually desirable for this group, but new knowledge can have dramatic impacts. The homestead is an intricate, complicated, production unit which produces an array of agricultural outputs. At the same time, it is a consumption unit with all of the associated inputs and outputs. Improvements in any phase of homestead operational efficiency will generate increased levels of individual or family welfare. The list of potential changes is wide and ranges from increased output from garden vegetables to development of wood fuel production to more efficient land utilization to better nutrition from improved food

preparation to more efficient child tending techniques. The varied aspects of homestead life offer excellent topics for training to augment the existing skills, competence, and knowledge of rural household managers. The homestead is also a viable unit for extensive study and can be benefited greatly from many forms of research and extension programming, especially those which are directed to improved production, consumption, and management efficiency.

Current USAID Programs[33]

The Women in Development (WID) programs of USAID began shortly after Bangladesh gained independence and were focused initially on relief and rehabilitation. The programs were designed to improve the earning potential of disadvantaged women, utilizing women's assistance groups existing in Bangladesh as the training agents. The programs were generally unsuccessful due to the bias introduced by upper class, highly politicized, urban women's leadership. The activities emphasized the development of new skills in the production of handicrafts for sale but were stagnated by lack of markets, which resulted in low pay for participants and little potential for permanent economic betterment.

Presently, the USAID Mission is utilizing its two-sector strategy--population and agriculture--to provide an orientation for WID activities. Population sector WID activities primarily assist women to achieve greater control over their reproductive lives by increasing the incidence of contraceptive use. Beyond these family planning initiatives, the Mission is supporting a pilot scholarship program for secondary schoolgirls to encourage higher enrollments. The program is based on the well-established fact that those with secondary education delay marriage to a later age and also limit the size of their families.

The Mission is also supporting a program for management training of women, both domestically and in third world countries. The program is designed to encourage career development of women in the BDG, including those in the nationalized banks. Additionally, funds are being used to assist women employees of the Bangladesh Small and Cottage Industries Corporation (BSCIC) to attain improved extension skills. An attempt also is being made to encourage rural women to undertake entrepreneurial activities in fields of competence. Loans are being provided for this purpose. A related effort is a preliminary study of street food enterprises, many of which are operated by women, to look for potential development interventions.[34]

The contribution made by women has been explicitly recognized in the agricultural research project currently funded by the

Mission. Development of improved horticultural products and the introduction of improved home food processing methods are identified as component project activities specifically for women. A horticultural specialist will be contracted to develop these initiatives. As part of the program, discussions are in process with the BDG to bring 150 women extensionists, trained previously through a non-USAID project, under the administrative jurisdiction of the research project to specifically interface with rural women in agricultural production, food processing, and other homestead-related activities.

Title II. Food for Work projects for women only, were initiated in 1978 to permit payment of a higher wage rate to women. Between 1978-81, about 303 "women only" projects were undertaken. These projects disbursed only 4 percent of the total FFW wheat distributed for all projects.[35] So far, the "women only" projects are not an important part of the total FFW program and have created special administrative problems in supervising the payment of a differential rate for women. A pilot women's road maintenance program was initiated in 1983. Under the program, women are paid a salary (Tk. 10 per day) to maintain an assigned segment of road. If successful, the program will be expanded in 1984. (A more complete discussion of Title II programs is presented in Chapter 7.)

The mission's other WID-related initiative is a study of the impact of rural electrification on fertility. The analysis is part of the evaluation for the rural electrification initiatives supported by USAID. The project also is designed to enhance productive uses of electricity, some of which will specifically address women's work needs.

The implications of women's status in Bangladesh to the development strategy and recommendations for USAID programming are considered in Chapters 9 and 10.

Summary

The status of women in Bangladesh is a product of many years of cultural, social, and religious tradition. The practice of purdah with its condition of women dependence and segregation has provided a strong historical basis for establishing women's roles and attendant division of labor in the household. The practice varies among rural and urban households as the urban upper class has had more of a tendency to discard many of the outward signs of purdah. Among rural residents the impacts have been strong, and women's roles are identified in large measure by the immobility created for them. Yet, the strictness of the practice is diminishing, albeit, less than in urban areas.

The role of rural women in Bangladesh is limited primarily to the home and homestead. A rural woman cares for the family,

carries out all aspects of the postharvest, and is totally responsible for the horticultural crops and small livestock produced on the homestead plus wood gathering, food preservation, and handicraft production in the home. She has little control in decision making with respect to field production but has jurisdiction over those areas for which she is responsible. The financial resources of the home are administered by her husband, but she has fairly complete authority over funds generated from the sale of her homestead production to the degree she can gain access to markets. Often, this is difficult since she cannot participate directly in the marketing of the products and must rely on intermediaries, usually from her household.

The inferior status of women has been detrimental to their access to education, nonagricultural employment, and participation in political activities. Urban women have fared considerably better than those in rural areas. Destitute rural women are being forced by necessity from traditional roles into various types of manual labor. FFW projects utilize many of these women.

In excess of 250 women's institutions have been organized since 1972 to assist rural women. Projects to provide new skills and establish a new role and those designed to improve existing skills are the most common types. Most are supported by non-governmental sources.

USAID's initial response to WID issues was focused on relief and rehabilitation. Currently, the Mission has several WID interventions which are component parts of its developmental programs, with emphasis on family planning.

Footnotes

[1]For examples of the differences in women's roles among some LDC's, see: Janet Z. Giele and Audrey C. Smock, Women Rules and Status in Eight Countries (ed.), (New York: Wiley and Sons, 1977); and A Seven Country Survey of the Roles of Women in Rural Development, a report prepared for USAID, Development Alternatives, Inc., Washington, D.C. 1974.

[2]Bureau for Program and Policy Coordination, Women in Development, AID Policy Paper (Washington: USAID, October, 1982).

[3]Rafiqul Huda Chaudhury and Nilufer Raihan Ahmed, Female Status in Bangladesh, Bangladesh Institute of Development Studies, Dhaka, no date.

[4]For a historical perspective of the cultural and religious background of women's status in Bangladesh, see: Audrey C. Smock, "Bangladesh: A Struggle with Tradition and Poverty," in Giele and Smock, Women Roles, pp. 83-126.

[5]Susan Fuller Alamgir, Profile of Bangladeshi Women, USAID, Dhaka, 1977, p. 12.

[6]Smock, "Struggle with Tradition," p. 92.

[7]Chaudhury and Ahmed, Female Status, p. 6.

[8]The classification of rural women and the information regarding the class observance of purdah were provided by Louisa Gomes, USAID/Bangladesh in a memo to the author dated April 12, 1983.

[9]Rural women, too, have generally discarded the burkha, but the incidence of use is higher than with the urban elite.

[10]Smock, "Struggle with Tradition," p. 94.

[11]Khushi Kabir, Ayshed Abed, and Marty Chen, "Rural Women in Bangladesh," Proceedings of Role of Women in Socio-Economic Development in Bangladesh, Bangladesh Economic Association, Dhaka, March, 1977, pp. 12-19. In this article, the authors describe and repudiate stereotypes as myths.

[12]Shamina Islam, "Women's Education in Bangladesh," in The Situation of Women in Bangladesh (Dhaka: UNICEF, 1979).

[13]Barkat-E-Khuda, Fertility Level and Attitudes and the Value of Children in Sreebollobpur; A Relatively Developed Bangladesh Village, Dhaka, Bangladesh Institute of Development Studies, New Series No. 29, October, 1980, pp. 53-55.

[14]Islam, "Women's Education," pp. 100-103.

[15]S. A. Ather, Evaluation Report on USAID Scholarship Program for Girls in Sharashati Thana, Comilla, USAID, Dhaka, March, 1983.

[16]It is of note that community leaders (mostly male) in the Comilla Pilot Scholarship Program generally expressed no objectives to girls attending a coeducational school and identified no significant social problems.

[17]Islam, "Womens Education, p. 11.

[18]Ibid, p. 116.

[19]For a summary of several nations, see: Kathleen Newland, Women and Population Growth, Choice Beyond Childbearing, (Washington: World Watch, December, 1977) Paper 16.

[20]R. H. Chaudhury, "Education and Fertility in Bangladesh," The Bangladesh Development Studies, Vol. V., No. 1, January, 1977.

[21]For a discussion of Bolivia as an example, see E. Boyd Wennergren and Morris D. Whitaker, The Status of Bolivian Agriculture, (New York: Praeger Publishers, 1975), Chapter 5.

[22]Smock, "Struggle with Tradition," p. 110.

[23]R. H.Chaudhury, "Married Women in Non-Agricultural Occupations in a Metropolitan Area of Bangladesh - Some Issues and Problems," The Bangladesh Development Studies, Vol. V., No. 2, April 1977, p. 187.

[24]Rounaq Jahan, "Political Participation of Women in the 1973 Election in Bangladesh," Paper presented at the annual meeting of the Association of Asian Studies. Boston, 1974.

[25]The descriptions presented here draws heavily from Rene Gerard, et al., Report of the Feasibility Survey of Productive Income Generating Activities for Women in Bangladesh, UNICEF, Dhaka, October, 1977.

[26]Gerard, Feasibility Survey, p. 29.

[27]This section relies considerably on Alamgir, Bangladesh Women, pp. 62-82.

[28]Ibid, p. 79.

[29]M. Elizabeth Marum, Women at Work in Bangladesh, USAID, Dhaka, 1982, p. 47.

[30]Chaudhury and Ahmed, Female Status, p. 152.

[31]Salma Khan, et al., (eds.), Inventory for Women's Organizations in Bangladesh, UNICEF, Dhaka, June, 1981.

[32]Islam, "Womens Education," p. 119.

[33]This section draws from Hugh Plunkett, "USAID/Bangladesh Women Development Strategy, 1983-85",: Mimeo (draft), USAID, Dhaka, undated.

[34]The loan project is from Mission funds. The food enterprises study is centrally funded by AID/Washington.

[35]Marum, Woman at Work, p. 3.

CHAPTER 6
AGRICULTURE AND THE PUBLIC SECTOR.

"Blueprints and organizational charts are meaningless fantasies unless manned by a corp of trained administrators equipped with the knowledge and resources to translate programs and policies into accomplishments and deeds."

Merle Faisod
Harvard University

Introduction

Since independence, the public sector has occupied a dominant role in the economy of Bangladesh. As the largest and most traditional sector, agriculture has been influenced significantly by BDG interventions. The scope of BDG influence emanated from the adoption of a post-independence political philosophy of highly centralized governmental control which was given first expression in 1972 via the nationalization of 254 industries representing four-fifths of the nation's industrial assets.[1] Much of the commitment to centralized management by the new government was an outgrowth of the relations between East and West Pakistan preceding hostilities. The BDG rejected the exploitation of the Eastern resources and people by the West and vowed to establish a people's state with individual equality. By tradition, the governmental sector had played a more important role than the private sector in the developmental affairs of East Pakistan. As a consequence, the system inherited by the BDG in the East had less acquaintance and experience with private sector management. This was exacerbated after most of the private enterpreneurs from the East exited to the West in the aftermath of the war. In some cases, privately held factories and businesses were totally abandoned by management, and the BDG was pressed to assume operational responsibility.[2]

The expanded involvement of government in the industrial sector necessitated a continuous dialogue to structure a philosophical base to guide the operational facets of the new regime.[3] Though never totally successful, the process produced numerous reorganizations of the BDG institutional structure in an

effort to reflect changing views of the functions and management efficiencies of government. The consequence was an extensive and excessive public bureaucracy that has never been completely successful in managing the nationalized industries or the large numbers of public programs. By 1975, twenty-four ministries had been established.[4] The number grew to thirty-eight by early 1981 under President Ziaur Rahman but was reduced to thirty later that year after his death. Then, in a last minute effort to consolidate his position and regain closer control in the face of charges of widespread corruption, President Sattar reduced the number to eighteen in early 1982 just prior to the takeover of the government by the military. The Martial Law Government has since made additional reductions, and the number of ministries currently stands at seventeen. The established Ministries are Defense, Home Affairs, Foreign Affairs, Finance and Planning, Agriculture, Food, Communications, Local Government, Law and Law Reforms, Energy and Mineral Resources, Industries and Commerce, Education and Religious Affairs, Works, Information, Health and Population Control, Social Welfare and Women's Affairs, and Labor and Manpower. The magnitude of the bureaucracy is only partially reflected by the number of ministries. There are large numbers of autonomous and semiautonomous public boards, corporations, and councils, and numerous divisions and directorates that function within the ministerial organization.

The more recent administrative reforms give the appearance of movement toward increased efficiency. There has been, however, only a limited reduction in BDG functions or organizational units in the process. Ministries which have been eliminated reappear in their entirety, almost without exception, as divisions within the new ministerial organization. A recent report (March 1983) to the Chief Martial Law Administrator (CMLA) has identified some reduction in administrative units but acknowledges no lessening of personnel. The BDG has, however, divested itself of some nationalized industries by returning several public corporations to the private sector. This process appears to be gaining momentum.

Irrespective, the agriculture sector's performance since independence has been affected most directly by the past BDG institutional structure and philosophy and not these more recent consolidations. A relevant question is whether future impacts on the agricultural sector will differ materially from the past, given the fact that, despite the reorganizations the scope of BDG functions have not been dramatically altered.

In this chapter, the assessment focuses on the relationships the public sector has with agriculture and investments which have been made and which are planned to facilitate agricultural development. Specifically, this chapter considers the organizational structure of the BDG and of particular ministries of most importance to the agricultural sector, the allocation of public funds among sectors and subsectors, and the issues of

public finance. The relationships of the BDG to agriculture in marketing, transportation, communications, and energy were discussed in Chapter 4.

Principal Government Agencies Related to Agriculture

Government Organization

Under the Constitution of Bangladesh, government rule is highly centralized under a unitary form of organization.[5] The president is the chief officer of state and of the government and is elected for a five-year term by popular vote of the people. The vice president is a presidentially appointed office and is second in the line of governmental hierarchy. The president is also the chief of the armed forces. The government is managed by a council of ministers headed by a prime minister. All high-level policies are established by the council which is composed of all ministers. Appointments to minister are made by the president and are held at his convenience. The president also appoints the chief justice, judges of the supreme court, and other high-level classes of governmental functionaries. The president also chairs the National Economic Council. The highest non appointed administrative officer in a ministry is the secretary who belongs to the permanent career corps of civil servants.

The legislature is unicameral and is called Parliament. The organization is sovereign in that the president has no veto power against its legislation. The 330 members are elected for five-year terms from 300 constituencies of those voters eighteen years and older. The additional thirty seats are reserved for women who are also elected to five-year terms.

Bangladesh has six tiers of geopolitical organization which includes 4 divisions, 22 districts, 74 subdivisions, 470 thanas, 4,500 unions, and an estimated 68,000 villages. Each division is administered by a commissioner and the districts by deputy commissioners. Both are career public service employees. Thanas are administered by BDG appointed circle officers. Local government is led by locally elected officials at the union (municipalities in urban areas) and village levels.

The system has two levels of administration that affect agriculture, centralized and functionally decentralized.[6] The two major levels of centralized administration are the office of the president and the ministries. The decentralized levels include public institutes and councils, public corporations and businesses, and product development boards. Units having decentralized administration are nominally controlled by one of the ministers who appoint the chairman. Usually, chairmen come from the civil service.

Public sector organizations, which partially or totally serve the agricultural sector, are found at both levels of administration. The centrally administered ministries of most importance are: Agriculture, Food, Industries and Commerce, Finance and Planning, Local Government, and Communications, plus their associated decentralized agencies, although partial functions of most ministries relate to rural people and the agricultural sector. All decentralized units have their own budgets, are free to make most technical and administrative decisions, and operate with general autonomy.

The Martial Law Government

The establishment of Martial Law in March 1982, has suspended the regular operation of the BDG at several levels. A Chief Martial Law Administrator (CMLA) now holds the position of supreme authority. Two Deputy Chief Martial Law Administrators (DCMLA) assist him. A president has been named by the martial law government as the titular head of state. All political activities are suspended within the country which means that the legislative branches do not function. The offices of vice president and prime minister are not filled under the present arrangement. All other levels of the government from the ministry downward are functioning much as before. All ministers are appointees of the CMLA, but most secretaries and other ministry officials are civilians, drawn from much the same pool of civil servants as existed in prior years, although individual changes may have occurred.

Under the martial law administration, the thana has been designated as the central unit of local government administration for a new system proclaimed to establish greater decision making at the local level and to eradicate poverty and exploitation. Under the new system, the thana ceases to be part of the subdivisional administration and functions directly under the district leadership. Responsibility for all developmental activities at the local level is placed with the thana parishad to be headed by an elected chairman. A thana nirbahi officer, appointed by the BDG, acts as the chief executive officer of the thana and serves as a staff officer to the chairman of the thana parishad. The thana parishad has the assistance of a professional staff, each of whom is responsible for supervising the programs associated with his specialty area. The staff consists of thana officers in health and family planning, education, agriculture, engineering, cooperatives, livestock, fisheries, and social welfare.

The program was implemented in November 1982 with the initial upgrading of 45 thanas. The inclusion of all 470 thanas under the system will be accomplished in stages over the next six to twelve months. An additional 55 thanas were upgraded in January 1983, and the process is continuing. Official announcements by

the CMLA have also placed cooperatives at a central point in building capability of local people to better plan and direct their own affairs.

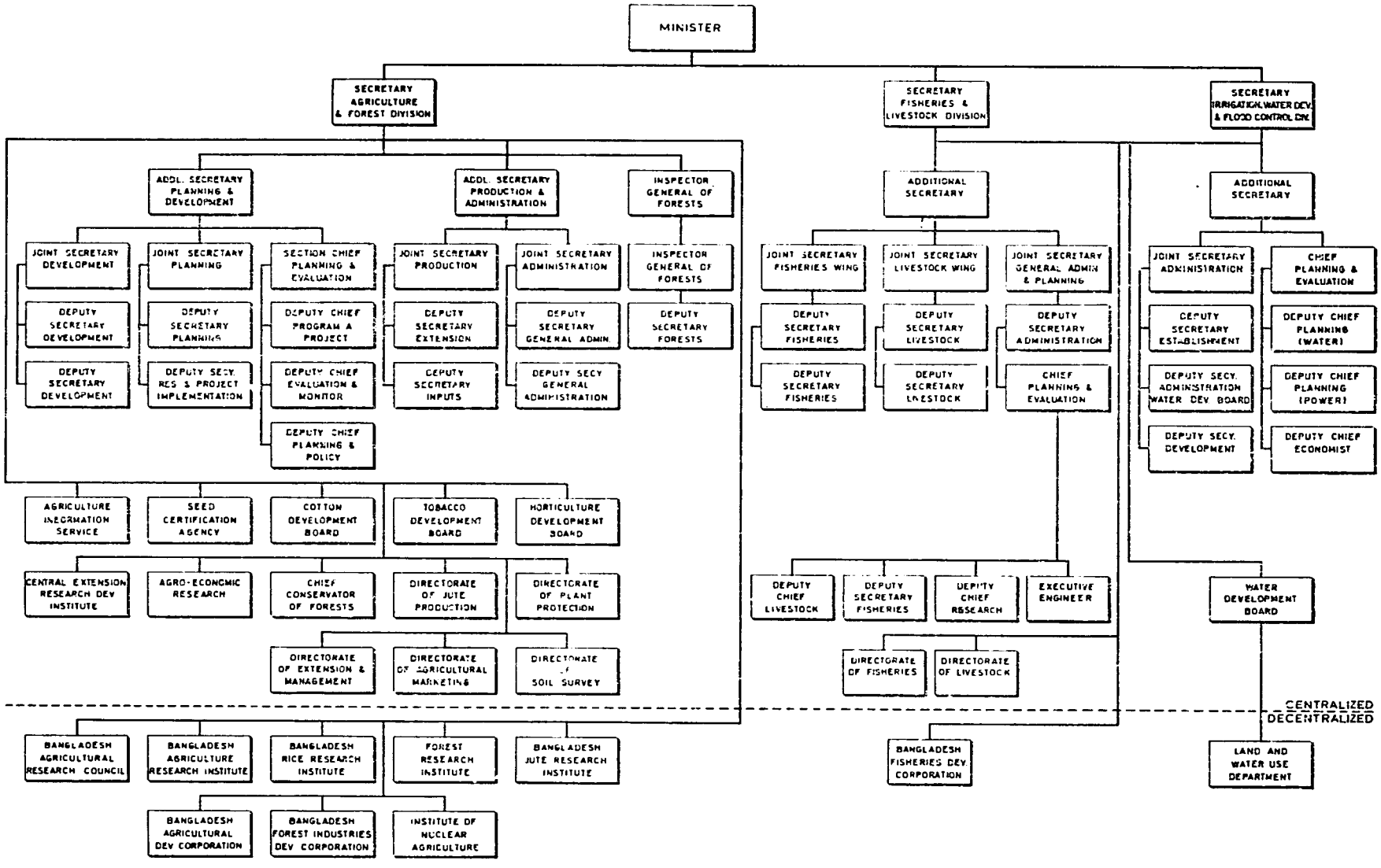
Ministry of Agriculture (MOA)[7]

The dominance of agriculture in Bangladesh has led to governmental attempts to structure the public bureaucracy in such a manner as to address major national problems with the full force of ministerial type organization. For this reason, the MOA has historically been divested of several functions and areas of responsibility which, in most countries, traditionally fall within its jurisdiction. Over the past decade, for example, ministeries for Jute, Fisheries and Livestock, Water Resources, Food, and Rural Development and Cooperatives were broken off from the MOA. The search for an appropriate organization to meet the nation's needs has led to a series of restructures of the ministerial system. The most recent change has featured a consolidation of several prior ministries into division status within a broader ministry organization. Such has been the case with agriculture.

The Ministry of Agriculture is one of two ministries whose central focus is the agricultural sector. MOA is administered by a presidentially (CMLA) appointed minister and is comprised of three major divisions, each of which is presided over by a secretary who is drawn from the civil service cadre (Figure 1). These include the Divisions of Agriculture and Forestry; Fisheries and Livestock; and Irrigation, Water Development, and Flood Control. Each division maintains its own administrative, planning, and evaluation capability which in essence defines a degree of autonomy. In day-to-day operations, the individual divisions function much like mini-ministries with limited interdivisional contacts and collaboration. The major point of such contact is at the secretary level and in the higher councils of the minister's office. These divisions represent the central program focus of MOA.

The Division of Agriculture and Forestry is the largest of the three and is generally charged with the responsibility for overall development of the sector. The division is subdivided into sections of: planning and development; production and administration; forests (each of which is presided over by an additional secretary); and several attached directorates and decentralized agencies. Most of the functions which have sector-wide implication are located in this division. For example, the Agricultural Extension Service falls under the Additional Secretary for Production and Administration. Other subject areas such as marketing, soils, plant protection, seed certification, and agricultural information are organized as attached directorates or agencies which are directly responsible to the Secretary for Agriculture and Forestry. Likewise, product-

Figure 1. MINISTRY OF AGRICULTURE



Source: Developed by author from information provided by the Ministry of Agriculture

oriented functions are placed in the organizational structure as developmental boards. Such boards for cotton, tobacco, and horticulture are centrally administered by the secretary. Jute production is designated as a directorate.

The Secretary for Agriculture and Forestry has administrative responsibility for eight decentralized public agencies. The largest and perhaps most influential of these to agriculture is the Bangladesh Agricultural Development Corporation (BADC). This corporation has had the primary responsibility for securing the basic inputs for the agricultural sector. Its activities have included procurement and marketing of fertilizers, promoting the adoption of new irrigation technologies, and growing and distrbuting improved seed varieties. As noted in Chapter 4, changes are in process as some of these functions are being shifted to the private sector. All of the other decentralized entities are fundamentally research focused. Some are oriented to specific crops such as rice, forestry, and jute plus the application of nuclear energy to agriculture. Most crop survey and research monitoring activities of the Division of Agriculture and Forestry are centered in the Agro-economic Research Section which is attached directly to the division secretary.

The Fisheries and Livestock Division is much smaller than Agriculture and Forestry, and includes one additional secretary plus joint secretaries for fisheries, livestock, and administration. The division maintains its own research component. One decentralized entity, the Bangladesh Fisheries Development Corporation (BFDC) is administered by the division and operates much as a commercial enterprise. It maintains its own fishing fleet and marketing operations. Additionally, BFDC functions as a wholesaler in marketing fish for private fisherman.

The Division of Irrigation, Water Development, and Flood Control has one additional secretary and two joint secretary level offices who handle administration, planning and evaluation. The latter function is a major component of the division which evaluates the elements of all water-related development projects in the agricultural sector. A primary decentralized unit is the Water Development Board (WDB) which has the major responsibility for the development of water resources in Bangladesh. The WDB maintains its own complement of technicians and analysts who program, implement, and monitor water development projects. Close collaboration is maintained with the Division of Planning in the Ministry of Finance and Planning.

The WDB, like similar noncommercial, decentralized units of the BDG, retains the primary authority for implementing projects in its assigned specialties. By contrast, the centralized units of the various ministries act mainly as administrative control agents which form BDG policy and provide interdivisional and interministerial coordinating functions. The presence of such an extensive number of decentralized bodies, both in the MOA and

other ministries, may reflect a response by individual units of the BDG to escape the past inefficiencies of general government administration. The decentralized units have independence of budget, which allows them more flexibility in implementing programs. They can avoid the extensive delays in decision making and budget releases which characterize so much of the centralized management of the BDG. The large numbers of public agencies are also a product of the early commitment of the BDG to centralized management of the economy. Several of these entities engage in commercial activities whereby the BDG is substituting for what might naturally be private sector initiatives. Jute and the BADC are examples.

The MOA has division, district, and thana level offices to promote agricultural programs in the rural regions. Thana level offices are headed by an agricultural extension officer and assisted by an agricultural (technical) officer. They are responsible to the MOA organizational hierarchy but must coordinate all activities with the thana circle officer, who is the BDG local governmental central authority assigned by the Ministry of Local Government. Extension is a large part of the thana level program, and agents are assigned to most villages. Additionally, most thana offices are staffed with officers in charge of livestock, fisheries, jute, extension, plant protection, family planning, education, and health. In the past, BADC has generally assigned a seed and a fertilizer inspector. Interestingly, the thana staffing does not include an officer with specialized training in rice production.[8]

Organizations at the division and district levels generally emphasize coordination. The district staffing includes positions for the agricultural specialists who service several thana areas. Specialists in soils, irrigation, agronomy, and other areas are assigned to the district level in the MOA structure. The combination of organizations at the three levels (thana, district, and division) results in a reasonably full representation of MOA central office programs for the various regions of the country.

Ministry of Food

The Ministry of Food (MOF) is one of the most important institutions in the public sector which impacts on agriculture. The ministry's main objective is to carry out the food policy of the BDG. The government's food policy incorporates, at its core, the public food distribution system. The MOF is responsible for the procurement, movement, storage, distribution, and rationing of foodgrains which pass through the rationing system. Furthermore, the MOF operates a price guarantee program to farmers by purchasing foodgrains at a preannounced price, which partially supplies grain for the rationing system, and to maintain stocks in storage to back the BDG's responsibility for

food security. The ministry also handles relief programs through food for work. There are no decentralized agencies of the BDG assigned to the MOF.

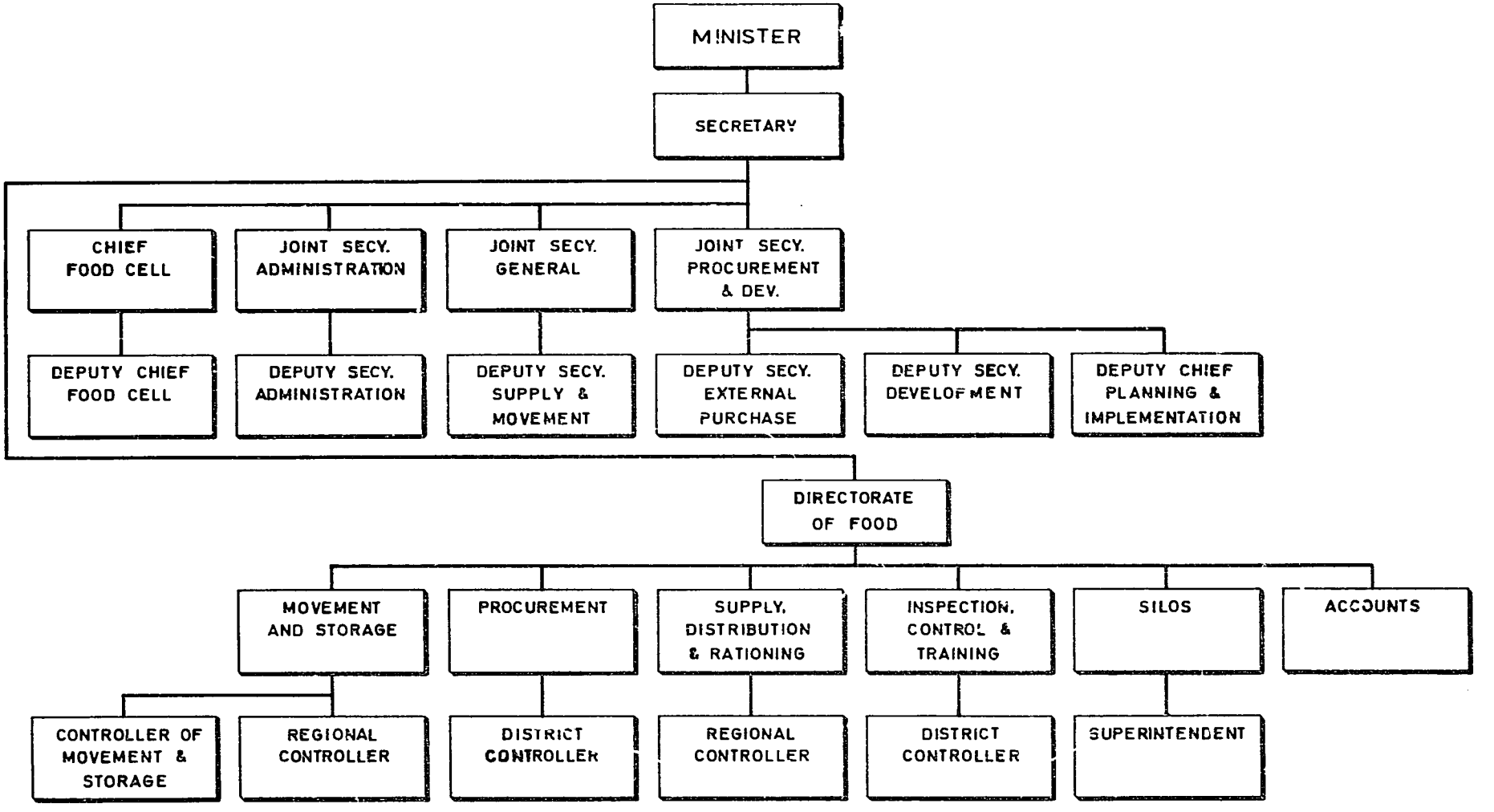
To implement its food policy mandate, the MOF maintains organizational jurisdiction at both national and regional levels. Within the Food Division of the MOF, three national level, joint secretaries report directly to the food secretary and handle the general administrative, procurement, and distribution functions (Figure 2).[9] A fourth joint secretary level unit, Directorate of Food, coordinates operation of the food system with the assistance of six directors who are assigned particular food-related functions of the directorate, i.e., movement and storage, procurement, supply, distribution and rationing, silos, and accounting. A newly created food cell at the joint secretary level has the responsibility for maintaining close surveillance of the food supply and demand conditions in the nation.

The Directorate of Food is responsible for the major functions which eventually place foodgrains in the ration stores throughout the country. Grains are purchased from local growers on the basis of announced procurement prices that are offered by the MOF. Additionally, imported foodgrains are brought into the system under MOF auspices. Both locally purchased and imported grains are held in BDG storage facilities. The national network of silos and warehouses for public foodgrain storage presently has a capacity of 1.8 million long tons.[10]

The MOF also maintains services at the regional, district, and thana levels. The ultimate activity in the system is to distribute food through 377 local supply depots which correspond roughly to the thana level organization. Final distribution to ration cardholders is made through a nationwide network of ration shops. Shops of four types are selected and licensed by the BDG under the supervision and control of the MOF: (1) government employee ration dealers; (2) modified ration dealers, (3) statutory ration dealers, and (4) dealers who supply to other priority recipients and larger employers who qualify for ration items. All ration shops are privately owned and operate under commission rates set by the MOF. The number of ration shops is not a published figure, but major cities have several in each of the four categories and rural areas are thought to have seven or eight per union.[11]

With this organizational structure, the MOF executes the BDG food policies and programs. Specifically, these duties include: (1) coordination of imports and exports of foodstuffs and civil supplies; (2) movement and storage of all government-related foodstuffs; (3) procurement and distribution of foodgrains and other food items, including sugar, edible oil, salt, etcetera, through the BDG rationing system; (4) administration of open market sales; (5) determination of prices for foodgrain procurement; (6) maintenance of liaison with international

Figure 2. MINISTRY OF FOOD (FOOD DIVISION)



Source: Developed by author from information provided by the Ministry of Food.

organizations on matters related to food security; and (7) generally watch over the food supply position of the country.[12]

Ministry of Industries and Commerce

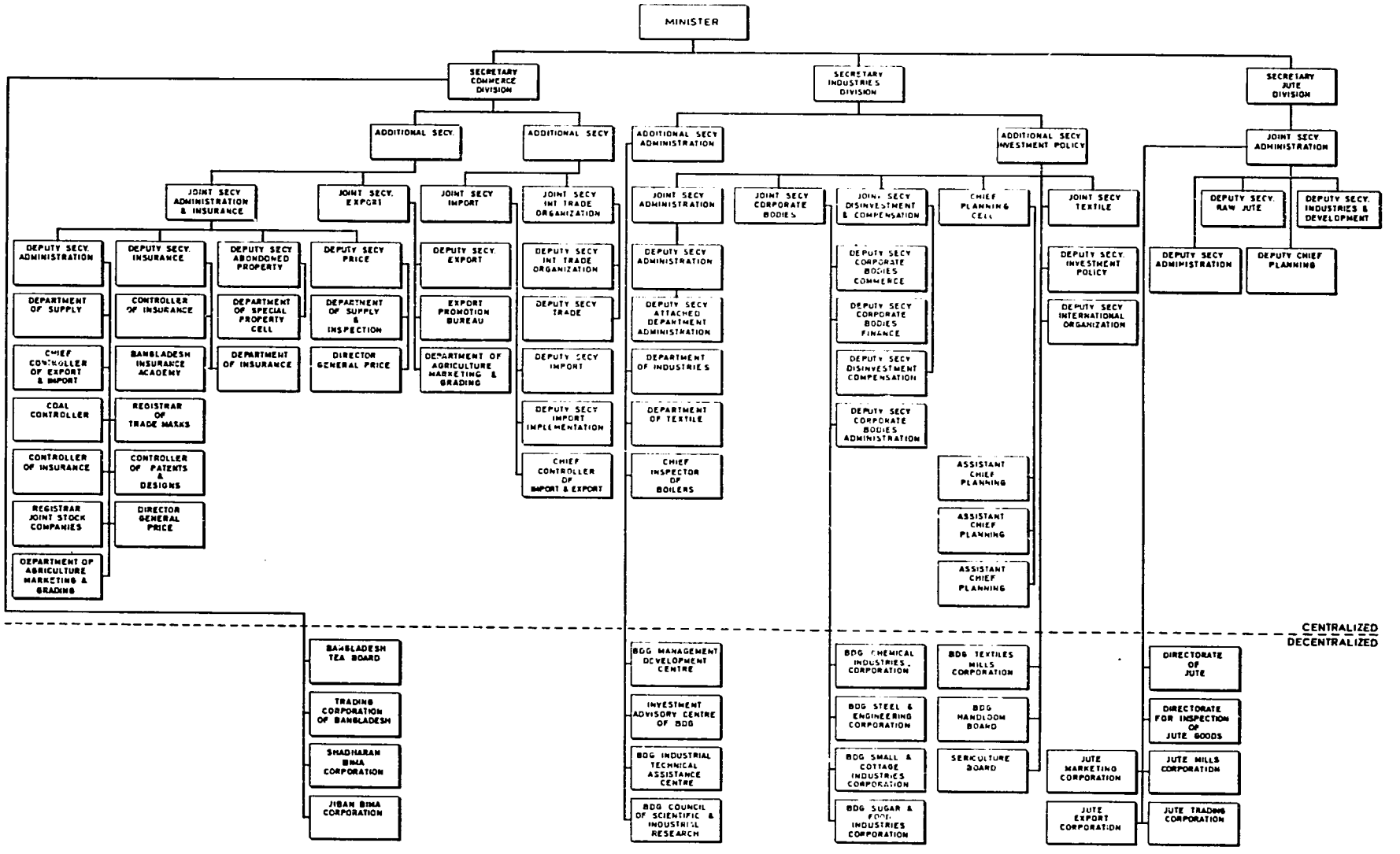
The Ministry of Industries and Commerce (MOIC) carries a significant ledger of activities which relate to or impact on the agricultural sector. In general, the MOIC is responsible for the conduct of industry and commerce both domestically and internationally.

The ministry is divided into three divisions: commercial, industrial, and jute, which, in turn, are administered by secretaries (Figure 3). The Commercial Division has several sections which impact on agriculture and, unlike some of the other ministries, its centralized administrative units actively engage in implementation of programs. The division is responsible for promoting imports and for the control and enforcement of BDG import/export regulations. Given the importance of agricultural products to both imports and exports, the activities of MOIC have a direct effect on the performance of the agricultural sector. Both domestic and export pricing policy also fall under its jurisdiction. A department (Agricultural Marketing and Grading) is maintained specifically to monitor and assist export traders with quality control and promotion of agricultural products. Additionally, the Commerce Division supervises BDG control and regulatory functions in the areas of patents and trademarks, insurance, and abandoned property disposal.

Four functionally decentralized agencies fall within the responsibility of the Commerce Division. Two are concerned with insurance sales which are not directly of consequence to agriculture. However, the Bangladesh Tea Board (BTB) and the Trading Corporation of Bangladesh (TCB) are of importance. Initially, TCB was entrusted with an almost exclusive role in transacting the nation's import and export business. However, during the period since independence, its role has been eroded as various public sector corporations now handle most of their own needs directly, and the private sector has taken on more prominence in filling the import/export needs of Bangladesh. The TCB maintains facilities in the major districts of Bangladesh where it engages in sales of a diversified list of imported items, mainly nonfood, hardware, and textiles. TCB involvement in imports has declined, but the corporation has increased its export activities.

The BTB promotes tea production primarily for its value as an export source. Developmental schemes are implemented under BTB auspices which involve public investment as well as donor assistance. The United Kingdom has been especially supportive of tea estate improvements since the early 1970s. The board maintains the Bangladesh Tea Research Institute (BTRI) which

Figure 3. MINISTRY OF INDUSTRIES & COMMERCE



Source: Developed by author from information provided by the Ministry of Industries & Commerce

conducts tea research and provides advisory services to the tea estates, most of which are privately held.

The Industrial Division of the ministry has four joint secretaries: (1) Corporate Bodies; (2) Disinvestment and Compensation, (3) Planning, and (4) Textiles. These secretariates are particularly involved in the management of the public corporations and in selecting public firms for disinvestment to the private sector and advising the Disinvestment Board. They also relate closely to the six semi-autonomous bodies and six public corporations which fall under divisional jurisdiction. Most of the semiautonomous bodies are concerned with industrial matters which are not so directly impacting on agriculture. One exception is the Bangladesh Handloom Board (BHB), whose promotion of handloom cottage industrial activities among the rural populace is of direct consequence to the sector. Among the public corporations, three of five utilize agricultural products as their primary materials. The Bangladesh Textile Mills Corporation (BTMC) and the Bangladesh Sugar and Food Industries Corporation (BSFIC) engage in the production and marketing of cotton materials and sugar products, respectively. The Bangladesh Small and Cottage Industries Corporation (BSCIC) promotes cottage-type production of all types (many of which involve agriculture) and gives emphasis to handicraft activities.

The Bangldesh Chemical Industries Corporation (BCIC) is the most diversified of the public corporations. About twenty-nine separate companies are administered by the corporation. BCIC has direct responsibility for the operation of all fertilizer production factories in Bangladesh. Likewise, all production of agricultural chemicals falls under BCIC jurisdiction.

The Jute Division of the ministry maintains a limited centralized administrative organization which gives support to and provides policy guidance and analysis for the decentralized corporations in their role of promoting jute processing and export. The responsibility for developing jute production is centered in the Directorate of Jute Production of the MOA. The decentralized bodies of the MOIC are all carryover units from the old Ministry of Jute which were merged into the MOIC and MOA in the most recent reorganization. The scope of the decentralized groups encompass a vertically integrated jute production and marketing system which goes from production to processing to export.

Other Ministries

The public sector is large and utilizes significant amounts of resources and personnel in its support of public programs. Because of the dominance of agriculture, it is difficult to identify ministries which do not in part affect the agricultural sector with a portion of their programs or organization. For

example, the Ministry of Finance and Planning (MOFP) occupies a critical role through its control of fund disbursement and its Division of Planning, which manages the national planning process. The Ministry of Communications (MOC) monitors the operation of six decentralized public corporations and boards, which operate in the areas of land and water, transport, and communication. The Ministry of Energy and Mineral Resources (MOEMR) manages the decentralized Bangladesh Power Development Board (BPDB) and the Bangaldesh Rural Electrification Board (BRER). Finally, the Ministry of Education (MOE) has jurisdiction over most of the educational system, which develops human capital used by agriculture. The exception is the transfer of the Bangladesh Agricultural University (BAU) to the MOA, which is reportedly in process.

This section has provided a overview of the organizational structure of the government and a flavor for the manner in which the public sector influences agriculture. Several impressions arise from the analysis. First, the recent consolidation of ministries would appear to be a correct move in terms of organizational efficiency. The question remains as to whether operational efficiency has as yet resulted. Few BDG functions have been eliminated and intraministerial coordination appears to be unimproved. Divisions are operating as relatively independent units with minimal coordination, except at the ministerial level. There is an extraordinarily large number of decentralized bodies which are managed by the various ministries. In many cases, these entities are commercial enterprises where the operations reflect the early BDG philosophy favoring centralized management of the economy. In recent months, the BDG has initiated the process of returning many of these firms to private sector operation. Included is much of the jute and textile complex. Given the inadequate economic performance of many of these industries, there appears to be a rational basis for disposing of known financial liabilities. But, aside from the savings of the subsidy to these public corporations, which has been the obligation of the BDG, added benefits seem likely to arise from a disinvestment process. Many of the centralized functions of the ministries are maintained solely to support or monitor the decentralized corporations. Certainly, this is the case with jute and several of the units involved in the Industrial Division of the Ministry of Industries. Elimination of public corporation control from the BDG could mean obsolescence for several ministerial functions. Disinvestment may not only make economic sense, it also could lead to reductions in the size of the bureaucracy.

Public Sector Administration

An expansive bureaucracy operates the public sector at both the centralized and decentralized levels of administration. There are no official published estimates of the number of public employees, but it is thought to be large.[13] Most public workers are hired under a civil service system which reaches up the organizational structure to the level of secretary in most ministries. Only ministers are drawn from outside the civil service lists. The service is of long-standing and is a legacy from the British Civil Service which was used throughout the subcontinent prior to 1947. At the time of partition, India and Pakistan built on the system by staffing it with their own people. The Pakistan system in the East was essentially continued by Bangladesh following independence.[14]

The present-day civil service is seen as a desirable career. Wages are low, but other amenities such as job security, housing, participation in the foodgrain rationing system, and medical assistance which accrue in varying degrees at different career levels, make the remuneration considerably better than that of the average Bangladeshi. In a programming sense, the civil service adds a technical and professional potential to the operation of the public sector which is not always found in developing nations. Governmental servants are granted tenure of employment and should be isolated from the capriciousness often associated with public appointments, all of which could bear well in developing quality administration with continuity. However, the potential of the system remains to be fully developed.

There is little evidence that the Bangladesh public sector, even with an operational civil service, is more efficient than those of other developing nations. The slow public sector response to even routine matters is widely criticized as is widespread administrative corruption which the current martial law government has vowed to eradicate. Conventional wisdom about the efficiency of the BDG identifies corruption as significant. In a recent study of Bangladesh's administrative organization, corruption was said to be prevalent and was characterized as a legacy which has been passed from the years of British rule through the Pakistan period into the new Government of Bangladesh.[15] However, as in most LDC's where corruption is present, there has been no systematic evaluation of its impact.[16]

The National Budget

The national budget of Bangladesh is composed of two major sections, the recurrent budget and the development budget. The recurrent portion includes funding for all of the operational

expenses incurred by the BDG to manage the public bureaucracy. No developmental expenditures are covered by the recurrent budget. The development budget constitutes the total developmental allocations as set forth in the Annual Development Plan (ADP). The ADP is a product of the national planning process and represents a composite of the annual development programs for all units of government.

The national planning function is centered in the Planning Division within the MOFP. The division is responsible for insuring that national development goals and priorities are determined and articulated. Furthermore, the planning division coordinates the process of assimilating the developmental programs of the many operating units of the BDG, which are focused through the ministerial structure, to arrive at an overall national plan. The External Resources Division (ERD) of MOFP functions in tandem with the Planning Division to organize and coordinate donor assistance. Under the BDG system, donor participation is used to offset differences which arise between the composite of the recurrent and ADP budget needs and the revenues which originate from taxation and other domestic sources.

Financing the public sector and its development programs in Bangladesh is made difficult by the inadequate base for generating public revenue. Domestic revenues are normally sufficient to support the current expenditure loads associated with nondevelopment functions. Financing the ADP relies heavily on donor support, and, in some years, the BDG has resorted to deficit financing to fill the total budget shortfall.

Current Expenditures

Since 1975, growth in recurrent expenditures has occurred at about the same rate among the various segments of government (Table 6.1). No significant dynamics have developed for any particular portion of the public sector as major classes of expenditures currently remain in essentially the same relative proportion as they were in the early years after independence. The overall consistency in budgetary expansion between 1975 and 1982 is demonstrated by the virtual equality of individual items as a percentage of total expenditures for the period. For example, general services expenditures, after a slight rising trend through 1980, have declined to a level approximating that of 1976. Agricultural expenditures have remained essentially constant at 1 to 2 percent of total recurrent expenditures. The annual growth in the agricultural budget was about equal to the overall budget.

The food subsidy was the only budget item which has declined considerably as a proportion of total current expenditures, but it has shown variability among years and a slight upturn in 1982.

TABLE 6.1
Current Government Expenditure, Bangladesh, 1975-82 Fiscal Year (millions of Taka)

	1975		1976		1977		1978		1979		1980		1981		1982		
	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Compound Growth[a]
																	%
General Services	**2315**	**41**	**3916**	**47**	**4292**	**52**	**5276**	**51**	**5700**	**51**	**6382**	**48**	**7241**	**49**	**8553**	**46**	**17**
General administration	968	16	1095	16	1599	19	2163	21	2341	21	2507	19	2638	18	2795	14	17
Justice & police	598	11	616	9	944	11	1056	10	1222	11	1372	10	1783	12	2188	12	21
Defense & military	710	13	1447	21	1702	21	2001	19	2069	18	2427	18	2742	19	3476	19	20
Scientific departments	39	1	38	1	47	1	56	1	68	1	76	1	78	1	94	1	15
Social Services	**1025**	**18**	**1225**	**18**	**1365**	**17**	**1857**	**18**	**2145**	**19**	**2467**	**18**	**2959**	**20**	**3259**	**18**	**19**
Education	822	15	930	14	1021	12	1353	13	1509	13	1728	13	2065	14	2316	13	17
Health	181	3	243	4	294	4	413	4	549	5	626	5	771	5	830	4	25
Social welfare	22		52	1	50	1	91	1	87	1	113	1	123	1	116	1	24
Economic Services	**706**	**12**	**464**	**7**	**543**	**7**	**726**	**7**	**741**	**7**	**892**	**7**	**1072**	**7**	**1206**	**7**	**12**
Agriculture	114	2	117	2	117	1	142	1	158	1	182	1	302	1	324	2	17
Manuf. & const.	326	6	160	2	180	2	222	2	277	2	318	2	344	2	368	2	18
Transp. & commun.	258	5	187	3	246	3	362	3	306	3	392	4	426	3	514	3	13
Debt Service	**313**	**6**	**438**	**6**	**689**	**8**	**707**	**7**	**879**	**8**	**1041**	**8**	**1153**	**8**	**2172**	**11**	**27**
Food Subsidy	916	16	1006	15	760	9	1060	10	959	8	1654	12	1094	7	1820	10	9
Railways	380	7	508	7	567	7	734	7	836	7	953	7	1237	8	1390	8	20
Contingency									30		30		50		50	b	b
TOTAL CURRENT EXPEND.	**5655**	**100**	**6837**	**100**	**8216**	**100**	**10360**	**100**	**11290**	**100**	**13419**	**100**	**14816**	**100**	**18450**	**100**	**18**

Sources: World Bank, Report No. 3768-BD, March 3, 1982, p. 206; and Report No. 4277, March 4, 1983, p. 142.

[a]Calculated by least-squares trend line.
[b]Not calculated.

Current public expenditures at both the centralized and decentralized levels have risen slightly more than threefold since 1975 to a value to Tk. 18.4 billion in 1982. The annual compound growth rate has been 18 percent. Defense and military represented the largest single expenditure item in 1982, followed by general administration and education. The foodgrain subsidy accounted for 10 percent of all current expenditures. Agriculture received only 2 percent to support all current services and activities, aside from those involved in the ADP. Only two other items, scientific departments and social welfare, received a lower allocation than agriculture from the recurrent expenditures budget. Many of the BDG development priorities, however, are more accurately expressed in the budgets developed under the ADP than in the budgets of the recurrent expenditures.

Annual Development Programs

Despite the potential restrictions implicit in funding arrangements, the nominal growth in the ADP since 1975 has been continuous (Table 6.2). The Tk. 27.2 billion budget for 1982 was the highest to date.[17]

Growth in the ADP has averaged 25 percent annually. Agricultural allocations have also grown at an annual rate of 25 percent. Despite these fairly favorable growth figures, however, the ADP has not kept pace with rising prices in Bangladesh, and the real value of the budget has declined. The allocation of funds among classes of activity has favored agriculture, rural development, and water resources. During 1981 the agricultural sector received 32 percent of the total ADP budget. This was a 3 percent increase over 1980 but reflected a generally stable funding level since 1975. The sectors's share was 34 percent then and in 1982 was budgeted at 32 percent. About one-half of ADP funds for the agricultural sector have been programmed for water and flood control projects. Agriculture, per se, gets slightly less than one-half of the total allocation to the sector while rural development efforts have received the small residual portion. However, the arbitrary breakdown of projects into these three categories clouds the allocation of funds to specific projects of direct consequence to agriculture. Of particular interest is the changed emphasis for water and flood control projects which previously had featured larger water control type structures and which now is directed to smaller on-farm water development and management activities.

No other sectors received anywhere near the allocation accorded agriculture, rural development, and water resources. Furthermore, there have been virtually no major changes in relative allocations among sectors since 1975. Even high capital use projects such as power, transport, and communications have remained within 1 or 2 percent or their same relative assignment of funds during the period. As measured by overall resource

TABLE 6.2
Sectoral Distribution of Annual Development Program, Bangladesh, 1975-82 Fiscal Year (millions of Taka)

Sector	1975		1976		1977		1978		1979		1980		1981		1982		Compound Annual Growth[c]
	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	Revised Budget	%	%
Agriculture, Rural Development and Water Resources	1784	34	2990	32	3148	31	3480	29	4688	29	6658	29	7548	32	8820	32	25
(Agriculture)	(639)	(12)	(1150)	(12)	(1529)	(15)	(1540)	(13)	(2344)	(15)	(2938)	(13)	(3227)	(14)	(3698)	(14)	(27)
(Rural development)	(285)	(5)	(480)	(5)	(420)	(4)	(510)	(4)	(619)	(4)	(748)	(3)	(749)	(3)	(1127)	(3)	(18)
(Water & flood control)	(860)	(16)	(1360)	(14)	(1199)	(12)	(1430)	(12)	(1725)	(11)	(2972	(13)	(3572)	(15)	(3995)	(15)	(25)
Industry	650	12	1360	14	1430	14	1900	16	3040	19	3627	16	3367	14	3677	14	27
Power, Scientific Res. & Natural Resources	712	14	1510	16	1313	13	1680	14	2525	16	3989	17	3778	16	4347	16	28
Transport	812	16	1250	13	1962	20	1760	15	2135	13	4040	17	3751	16	3802	14	25
Communications	186	4	345	4	307	3	510	4	431	3	802	3	731	3	603	2	19
Phys. Plan. & Housing	340	7	660	7	630	6	810	7	966	6	1448	6	1467	6	1774	7	24
Education & Training	288	6	450	5	473	5	580	5	641	4	649	3	970	4	1071	4	18
Health	218	4	330	4	320	3	430	4	476	3	700	3	658	3	742	3	19
Population Planning	77	2	250	3	216	2	310	3	467	3	593	3	696	3	863	3	35
Social Welfare	20	b	40	b	29	b	50	b	65	b	216	1	242	1	296	1	50
Manpower & Employment	13	b	30	b	20	b	40	b	69	b	97	b	105	b	198	1	42
Cyclone Reconstruction	150	3	285	3	80	1	140	1	162	1	50	b	--	--	--	--	--
Other	--	--	--	--	129	1	340	3	361	2	431	2	395	2	960	3	35
Total ADP	**5250**	**100**	**9500**	**100**	**10057**	**100**	**12030**	**100**	**16026**	**100**	**23300**	**100**	**23690**	**100**	**27153**	**100**	**25**

Source: World Bank, Report No. 4277-BD, March 4, 1983, p. 143.

Note: Reported actual expenditures are: taka 2674 million for 1972/73, taka 3050 million for 1973/74, and taka 3932 million for 1974/75. It is believed that these totals may understate the level of expenditure due to the provisional nature of some entries and the possibility of incomplete recording. Taka 8500 million is the revised estimate for 1975/76.

[a]Total may not add to 100 percent due to rounding.
[b]Less than 1 percent.
[c]Calculated by least-squares for 1975-81.

allocation, there have been only minimal changes in developmental priorities since 1974, despite verbal declaration by BDG officials which would suggest otherwise.

The apparent constancy of developmental priorities within the context of the problems, resources, and short political history of Bangladesh need not be viewed with special concern. As a young nation in 1971, Bangladesh faced enormous development issues. The first five-year plan identified reconstruction of the economy, population control, economic and agricultural growth, and reduced dependency on foreign assistance as major objectives for the first period.[18] But, the targets remained largely unrealized as the needed resources could not be effectively mobilized. Shortfalls in domestic and external resources, inadequate institutional support, lack of skilled manpower, and unfavorable weather, among other things, limited the capability of the BDG to achieve its ambitious developmental objectives. A second plan, this one for only two years, followed with essentially the same targets as the initial five-year plan. A major motive for the two-year intermediate plan was to provide an opportunity to consolidate the activities of government, in particular the large number of unfinished projects which plagued the BDG toward the end of the first plan period. Partial success was achieved, but as the BDG entered its second five-year plan, the general objectives of the first seven years still remained essentially unfulfilled.

The absence of major shifts in the intersectoral allocation of the ADP funds simply reflects this lack of success and the need to stay on the original course. Bangladesh today faces essentially the same problems that were articulated in the immediate post-independence years, and the priorities are basically unchanged.

Agricultural growth, population control, infrastructural development, reduced dependency on foreign assistance, with all of their attendant strategies, consequences, and projects are still among the paramount priorities which guide the developmental efforts of Bangladesh today. This need not necessarily imply that no progress or changes are occurring intrasectorally. To the contrary, specific improvements have taken place and many have already been documented herein, particularly in the agricultural sector. For example, acceptances of new production technologies is increasing which has implications for program directions within agriculture. Strategy directions have been altered to give more emphasis to private sector initiatives in mobilizing resources. Capital-intensive flood control projects recently have been de-emphasized in favor of on-farm irrigation which highlight surface and ground water applications. The construction of roads, power, and other infrastructure is also progressing. Furthermore, the population control effort is proceeding, albeit, slowly.

The main issues which could be addressed is whether the initial allocations of investments, which have generally persisted throughout the period, are the correct ones to promote the elements of growth needed by Bangladesh. Currently only 32 percent of the ADP allocation is to the traditional agricultural sector which accounts for about 50 percent of the GDP and contributes even greater proportions of the foreign exchange earnings of the nation.[19]

Likewise, the total public investment in agriculture is equally in question in recognizing the relative importance of the sector. In 1981, the ADP allocation plus the expenditures on agriculture from the recurrent budget totalled TK. 7.8 billion. The 1981 allocation to agriculture represented only 20 percent of the Tk. 38.5 billion total BDG budget. Moreover, the ADP budget for agriculture includes the BDG subsidies on fertilizer and irrigation equipment. When the subsidies are removed, the share of ADP budget going to the sector is reduced to about 28.5 percent, and only 16 percent of the total allocation was to non-irrigation/flood control agricultural programs.

Government Financing

Current Revenue

Collections of current revenue by the BDG demonstrate the same stability of trend and composition exhibited for recurrent expenditures (Table 6.3). Government revenues rely very heavily on taxes, most of which come from indirect sources that are classified as "production, consumption, and distribution." The breakdown between tax and nontax revenue has remained fairly constant since 1975 with about 75 percent of the revenues arising from tax sources. Exceptions occurred in the years from 1978-80 when tax revenues rose to more than 95 percent due to increases in custom duties and sales taxes and concomitant reductions in nontax revenues from nationalized industries.

Among the individual revenue sources, custom and excise duties plus sales taxes accounted for 65 percent of the total. Agriculture is little affected by the revenue-generating process of the BDG, aside from the effect of taxation on imports and exports (which is considerable). Land taxes amount to only 1 percent of the total intake. Revenue from forest cuttings totalled 1 percent. Income taxes, most of which are paid by the nonfarm population, amounted to 10 percent.

In general, public sector revenues come from the areas in the economy which are administratively most easily accessed for taxation and ignore some areas of obvious political sensitivity. For these reasons, imports and exports represent important sources of revenue, and land and income relatively less. Since

1973, tax revenue as percentage of GDP have increased from 5.4 percent to 11.9 perce t in 1981 (Table 6.3). Tax revenues have grown in total volum at an annual rate of 22 percent. Despite the trends, the amount of taxes remain woefully insufficient.

In 1981, the gove ment undertook new initiatives to increase overall revenues by T . 890 million or 5 percent of anticipated tax income for the ye . The measures were partially successful, but their impact was omewhat reduced by increased governmental expenditures.[20] Some ecent efforts (April 1982) by the martial law administration h ve been directed at improving income tax compliance by citize s. Failure to pay past income taxes was forgiven if the tax w s declared and the amount due invested in BDG approved financia instruments, primarily government savings bonds, BDG insurance mpanies, or the Investment Corporation of Bangladesh (ICB). T e move is presumably the beginning of a policy to more closel control filings of incomes taxes.

The tax collect n arm of the BDG is housed within the Ministry of Finance u ler the Internal Resources Division. It is headed by the Nation Board of Revenue (NBR) and is structured primarly to accommo te the collection of customs taxes with collectors located a Dhaka, Chittagong, and Khulna. The NBR handles all classes of revenue collection. Its income tax efforts, however, ve proved ineffective and suffer from traditional kinds of eficiencies which inhibit national income tax programs. The NB lacks an adequate enforcement arm. Only a small portion of the axable income sources in Bangladesh are subject to regular t ation. Avoidance levels are presumably high. The payment f taxes is made difficult because many people, especially ru al residents, do not have the information required by even the east sophisticated income tax system. Such rudimentary data ne ls as total annual income and production costs are not readi known by farmers. Unless the level of voluntary compliance f the populace is high and the base broad, revenues will be m imal and the system will struggle for efficient implement tion and suffer from a high incidence of inequality.[21]

Land taxation al suffers from the inherent resistance of farmers to accept ta ation in the face of extremely low living standards. As curren y structured, land taxes contribute only a negligible amount the mobilization of public domestic resources. The majo revenue source is a developmental tax on agricultural land w ch has amounted to Tk. 3 per acre on land holding up to 8.3 ac s and Tk. 15 per acre for larger acreages. Total revenues were , 288 million in 1981, which hardly cover the collection costs.

Nontax revenues h ve increased at about the same rate as tax revenue. The inadequ te performance of the public corporations and other nationalize entities engaged in commercial activities have limited greater owth. Public ownership includes six major categories and fift separate enterprises (Table 6.4). Some

TABLE 6.3
Central Government Current Revenue, 1975-82 (taka millions)

	1975	1976	1977	1978	1979	1980	1981	1982		Compound Growth[h]
	Actual	Revised Budget	Revised Budget	Revised Budget	Revised Budget	Revised Budget	Revised Budget	Revised Budget	%	%
Tax Revenue	**5479**	**6718**	**7633**	**9842**	**11821**	**14363**	**17818**	**19681**	**77**	**21**
Production, consumption, & dist. taxes	4288	5730	6401	8332	10088	12328	15198	16655	65	22
(Custom duties)	(1517)	(2602)	(2890)	(3950)	(4948)	(6500)	(7500)	(7850)	(31)	(26)
(Import license tax)[a]										
(Excise duties)	(1503)	(1780)	(2030)	(2300)	(2445)	(2700)	(3730)	(4628)	(18)	(16)
(Sales taxes)	(619)	(1105)	(1230)	(1770)	(2305)	(2700)	(3400)	(3500)	(14)	(27)
(Stamp taxes)	(270)	(170)	(160)	(210)	(265)	(290)	(530)	(635)	(2)	(18)
(Motor vehicle taxes)	(17)	(12)	(13)	(20)	(30)	(38)	(38)	(42)	i	(21)
(Entertainment taxes)	(64)	(50)	(78)	(82	(95)	(100)	(--)	(--)	i	(11)
Taxes on income	677	804	1044	1240	1240	1761	2200	2601	10	21
Land revenue[b]	87	106	179	250	253	259	288	308	1	20
Other taxes and duties[c]	427	78	9	20	15	15	132	117	i	(-6)
Nontax Revenue	**1358**	**2108**	**2328**	**2604**	**3206**	**3914**	**5612**	**5858**	**23**	**22**
Nationalized Sector	127	352	285	599	547	795	1850	1432	6	40
(Industries)	(99)	(73)	(10)	(250)	(200)	(165)	(930)	(260)	(1)	(39)
(Banks)	(28)	(261)	(250)	(337)	(335)	(618)	(830)	(1110)	(5)	(50)
(Other public sector)[d]	(--)	(18)	(25)	(12)	(12)	(12)	(90)	(62)	i	(25)
Interest receipts	159	736	854	816	1066	1206	1448	1605	6	28
Registration fees	110	100	90	105	150	220	230	270	1	17
Forest	47	45	70	100	145	150	300	350	1	37
Railways	396	307	545	596	811	925	1050	1250	5	21
Post office, telephone, & telegraph (net)	-5	19	-2	-37	-77	31	5	81	i	--
Other[e]	514	549	476	476	564	587	729	870	3	8
Total Current Revenue	**6837**	**8826**	**9961**	**12446**	**15027**	**18277**	**23430**	**25538**	**100**	**22**
Tax Revenue of GDP (%)[g]	5.4	8.2	9.5	9.6	10.4	10.5	11.9	--	--	--

Sources: World Bank, Report No. 4277-BD, March 4, 1983, p. 141.

[a]Tax was imposed in June 1974 and abolished in May 1975.
[b]Tax levied on land holdings. It was virtually abolished in 1974 together with the imposition of the moratorium on agricultural income tax but reinstated in 1977.
[c]Includes electricity duties, estate duty on agricultural land, taxes on immovable property, gift taxes, capital gain tax, jute tax (abolished in May 1975), toll taxes, betterment tax on commercial establishments, and other levies.
[d]Includes receipts from nationalized insurance, other industrial operations, and disinvestment of industrial units. For 1973/74, these are included under "Industries" above.
[e]Receipts of various government departments, especially under civil works, education, and health.
[f]Including additional revenue from new fiscal measures (Taka 1107 million).
[g]Calculated by authors using GDP data in Table 1.1.
[h]Calculated by least-squares trend line.
[i]Less than 1 percent.

corporations have responsibility for several smaller production activities such as the Bangladesh Chemical Industries Corporation (BCIC) which includes twenty-nine individual producing enterprises within this network. The list of public corporations includes commercial and trading businesses, production enterprises, insurance, banking and finance, and developmental organizations. A final group of public enterprises are engaged in public transport, power, and communication services.

The financial performance of the fifty public corporations and autonomous bodies has been far below the level needed to provide economic progress and avoid added financial stress in the BDG. Data are not readily available on the longer run performance of these public enterprises, but conventional knowledge is that their productivity has lagged and they have not shown the capacity to generate consistently positive returns to the BDG. The losses sustained by the nationalized industries are another subsidy and budget burden which the BDG has had to absorb.

In 1982, four of the six major categories realized net losses. The composite of all groups registered a net loss of Tk. 1,208 million (Table 6.4). The largest losses came from the commercial trading corporations whose total deficit was Tk. 1,943.4 million. Developmental organizations lost Tk. 580.1 million and production enterprises Tk. 526.4 million.* A major earnings shift is projected for the production enterprises which are expected to earn Tk. 82.7 million surplus after the loss in 1982. Since the jute enterprises play such a significant role in this group, the projection may prove erroneous given the volatile nature of jute manufacturing and trade. Jute operations are continually faced with the exigencies of dealing in world markets. The jute enterprises turned a profit in both 1980 and 1981, after six consecutive years of significant losses,[23] but in 1982 the aggregate jute loss for all four autonomous bodies was Tk. 800.6 million.

Of particular note is the unusually good performance reported for the national bank and insurance companies, all of which recorded pretax profits for both 1982 and 1983 (projected). Profits among the fourteen institutions ranged from Tk. 1.1 billion to Tk. 26.7 million. The largest 1982 profit was by the Bangladesh Bank.

The report of such consistently high returns by the banking system must be viewed with skepticism inasmuch as very high levels of old and overdue loans (bad debts) are still carried on the books as interest-bearing assets. The banking (and credit) system is renowned for its deficiencies and inability to remain

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*The projections for 1983 are for a significant improvement, but nonetheless, a composite loss of Tk.822.7 million.

TABLE 6.4
Financial Performance of Public Corporations and Autonomous Bodies, Bangladesh, 1982 and 1983

Name of Organization	Pretax Profit 1983 Estimate	Pretax Profit 1982 Revised Estimate	Name of Organization	Pretax Period 1983 Estimate	Pretax Period 1982 Revised Estimate
	---(million Taka)--			---(million Taka)--	
A. Production Sector	**82.7**	**(526.4)**	**D. Banking & Financial Inst. (cont'd)**		
1. Jute Mills Corporation (BJMC)	(656.3)	(629.0)	4. Rupali Bank	74.4	63.2
2. Textile Mills Corporation (BTMC)	101.7	(542.2)	5. Uttara Bank	58.7	45.5
3. Steel and Engineering Corporation (BSEC)	93.0	16.4	6. Agrani Bank	80.2	66.3
4. Sugar & Food Industries Corporation (BSDIC)	498.6	507.5	7. Janata Bank	124.9	98.8
5. Chemical Industries Corporation (BCIC)[a]	38.4	15.6	8. Drishi Bank	157.7	124.7
6. Small & Cottage Ind. Corporation (BSCIC)	9.1	(6.6)	9. Shilpa Bank	114.3	89.8
7. Forest Industries Dev. Corporation (BFIDC)	30.7	26.8	10. Shilpa Rin Sangstha	97.0	114.4
8. Freedom Fighter Welfare Trust (BFFWT)	6.6	3.2	11. House Building Financing Corporation (HBFC)	48.3	26.7
9. Mineral Exploration & Dev. Corp. (BMEDC)	13.5	(41.6)	12. Investment Corporation of Bangladesh (ICB)	28.0	26.7
10. Petrobangla	150.8	123.5	**E. Insurance Corporations**	**362.9**	**306.3**
B. Commercial and Trading Sector	**(2544.4)**	**(1943.4)**	1. Jiban Bima Corporation	77.1	62.3
1. Jute Trading Corporation (BJTC)	(56.7)	(94.3)	2. Shadharan Bima Corporation	285.8	244.0
2. Jute Marketing Corporation (BJMC)	(95.9)	(76.9)	**F. Development Organizations**	**(785.0)**	**(580.1)**
3. Jute Export Corporation (BJEC)	(0.5)	0.4	1. Agricultural Development Corporation (BADC)	202.9	81.4
4. Trading Corporation (TCB)	98.5	74.9	2. Film Development Corporation (BFDC)	5.2	4.6
5. Fisheries Development Corporation (BFDC)	22.1	4.2	3. Inland Water Transport Authority (BIWTA)	(11.6)	(15.9)
6. Porjaton Corporation (BPC) (Tourist)	(15.5)	(12.2)	4. Chittagong Port Authority (CPA)	118.7	105.5
7. Petroleum Corporation (BPC)	(2496.5	(1839.5)	5. Chittagong WASA	(5.1)	(0.3)
C. Transportation Sector	**(208.7)**	**(444.8)**	6. Chittagong Development Authority (CDA)	19.8	(23.5)
1. Shipping Corporation (BSC)	125.4	(5.3)	7. Water Development Board (BWDB)	18.5	0.6
2. Inland Water Transport Corporation (BIWTC)	(70.0)	(86.1)	8. Power Development Board (BPDB)	(1067.4)	(778.7)
3. Biman Corporation (BBC)	(134.7)	(207.5)	9. Dhaka WASA	75.3	47.6
4. Road Transport Corporation (bus) (BRTC)	(132.7)	(149.7)	10. Dhaka Improvement Trust (DIT)	15.4	6.2
5. Road Transport Corporation (truck) (BRTC)	3.3	3.8	11. Khulna Development Authority (KDA)	1.4	(7.6)
D. Banking & Financial Institution	**2269.8**	**1980.6**	12. Tea Board (BTB)	4.8	6.3
1. Bangladesh Bank	1242.4	1113.7	13. Port of Chanla Authority	(161.1)	(5.5)
2. Sonali Bank	201.8	184.0	14. Rajshahi Town Development Authority	1.9	(0.8)
3. Pubali Bank	42.1	26.8	**Total**	**(822.7)**	**(1207.8)**

Source: Ministry of Finance and Planning, **Budget Estimates for Autonomous Bodies, 1982-83.**

[a]Includes twenty-nine individual enterprises of which eighteen showed pretax profits and eleven incurred losses in 1979-80.
[b]Parentheses denote losses.

viable without continued infusions of BDG support to maintain its lending portfolio and cover its losses. (A more detailed discussion of these issues was presented in Chapter 4.)

The conventional knowledge about the financial system and the official data reported here are not compatible. Unfortunately, the data which are readily accessible do not permit a total reconciliation or explanation of these discrepancies. But some insight is possible, particularly on the important issue of "bad debt write-off" which was raised previously and which is potentially the basis of this discrepancy.

None of the ten national banks have established adequate bad debt reserves to reflect loans which are sufficiently past due to be considered uncollectable. The banking system in Bangladesh argues against bad debt reserves on the basis that all loans are secured by land collateral and, even though loans are deficient, they are eventually paid or foreclosure procedures are initiated. In practice, however, foreclosures are seldom initiated due to the cumbersome legal process. Furthermore, many of the loans are made to other public corporations and institutions and, even if they become delinquent, are not considered bad debts since they belong to another public entity. The inadequacy of bad debt reserves in the banking system is a distinct departure from general banking procedures and sound financial policies found in most countries. Even with collateral, bad debt reserves of 3 to 5 percent are traditionally established to reflect sound financial management.

Available data do not permit an analysis of all banks included in Table 6.4. But, to illustrate the importance of the issue and its relevance to the pretax profit reports, data for six banks (Sonali, Rupali, Pubali, Uttara, Agrani, and Janata) were analyzed for 1982. The six banks repoted a combined pretax profit of Tk. 485 million. The same banks had loans in 1982 of Tk. 19.2 billion.[24] In Chapter 4, a World Bank evaluation was quoted which estimates that 37 percent of the loans in the credit system annually pass the due date for repayment. At that level, Tk. 7.1 billion became delinquent for these six banks in 1982. If this estimate was used as the basis for a bad debt reserve, the resultant loss would be considerable and likely unrealistic for management purposes. More conventional reserve levels are from 3 to 5 percent. At 5 percent, the reserve would amount to Tk. 960 million, and at 3 percent it would be Tk. 576 million. In both cases. the bad debt reserves exceed the Tk. 485 million pretax profits claimed for these six banks and in 1982 net losses would occur.

A projection of the data for these banks to the total banking system would generate a pretax loss instead of a profit and heighten the total subsidy burden of the BDG. Based on the history of continued capital shortages, it would appear that a more realistic scenario for the system is losses rather than the highly profitable picture portrayed by the data in Table 6.4. If

this is the case, elimination of the Tk. 1.98 million profit would result in a total loss in excess of Tk. 3.0 billion for all autonomous bodies in 1982 and the 1983 situation would be even worse.

The autonomous enterprises, especially those associated with energy resources, have also been loss-ridden due to their heavy debt burden and to the low utilization of their capacity. The debt service issue has reached a significant level. Since 1979, the legal debt service obligations rose from Tk. 1.82 billion to Tk. 3.11 billion in 1981 for all BDG autonomous bodies. The actual recovery in 1981 was only Tk. 1.40 billion.[25] Such shortfalls in debt servicing have obvious importance to long-run economic viability of the individual firms, especially if fixed obligations cannot be paid. Two of the highest losses by autonomous bodies were recorded by the BPDB (Tk. 778.7 million) and the BPC (Tk. 1,839.5 million) in 1982. The projected situation for 1983 is for improvement by BPC but a worsening of conditions for BPDB. These firms, and others concerned with petroleum, have faced varied financial histories and have struggled to deal with the rising costs of imported petroleum.

The rising fuel costs have also caused considerable pressures on the BDG transport agencies. Fuel cost escalations plus the generally rundown conditions of the physical facilities, particularly for water transport and railways, limit the potentials for profitable operations. Air transport enterprises in Bangladesh have suffered the same fate as airlines worldwide with increased fuel costs and fierce overall competition. In the case of Biman Airlines, operational inefficiencies have also contributed to the large losses which in 1982 totalled Tk. 207.5 million and are projected at Tk. 134.7 in 1983. The BIWTC and the BRTC have both encountered similar fuel cost hikes which have contributed to significant losses in 1982, which are projected to continue in 1983.

As a general proposition, the public corporations have suffered poor performances for two basic reasons. First, the pricing policies on many products handled by these firms are set on the basis of average production costs. This procedure, plus the BDG reluctance to permit needed price increases, and in some cases their insistence on maintaining low consumer prices, has severely strained the economic viability of several of the corporations. Additionally, cost-plus arrangements can negate the incentives of public managers and employees. Also, the economic processes are such that price changes, when permitted, invariably lag behind increases in production costs which, during any type of inflationary period such as has been experienced by Bangladesh, creates a built-in system for economic losses.

Secondly, the public corporations do not have adequate management to correct the operational inefficiencies which plague the public sector. Many examples support this position. For example, labor productivity in the jute and textile industries

are reportedly 50 percent of the 1970 level. Also, utilization of railway wagons declined from 18.2 miles/wagon/day in 1970 to 8.7 miles/wagon/day by 1978.[26]

The weak performance of the public enterprises has led the BDG to seriously consider their return to private management. A decision in May 1982 led to the return of about eighteen smaller type public industrial units including tanneries, oil mills, paper mills, etc.[27] Discussions are in process concerning a large number of other enterprises, including textiles and jute.[28] As of December 1982 eighteen of the mills have been returned to their prior owners, and another forty-four are in the process of transfer.

Overall Budget Management

The overall BDG budget has been in deficit throughout the period. Current revenue collections have been more than sufficient to meet current expenditures for all years since 1975 (Table 6.5). Overall, the surplus of current revenues over current expenditures has grown consistently since 1975, increasing sixfold by 1982. However, the Annual Development Program (ADP) budget has always been larger than the surplus from the current budget which has led to an overall deficit each year.

The ADP budget has increased almost sevenfold in current prices since 1975 at an annual rate of 27 percent. This increase has offset the current budget surplus which has grown at 32 percent annually. In 1982, the overall deficit faced by the BDG was Tk. 21.7 billion and the annual average deficit since 1975 has been Tk. 12.3 billion.

While the budgetary deficit is defined by the residual between the ADP and the current budget surplus, it is actually a wider ranging problem related to several development issues which impact significantly on the financial structure of the BDG. Of special note are the costs of subsidization which result from the BDG policies on foodgrain rationing and agricultural inputs. These subsidies add an important burden to the budget. Additionally, the losses sustained by BDG public corporations and boards that are engaged in commercial enterprises are all contributory to the deficit. These pressures, combined with the weak revenue base, illustrate the plight of the BDG. The government has demonstrated an awareness of the issues and has taken some remedial actions. Increasing ration foodgrain prices, raising fertilizer prices, divesting inefficient public enterprises to the private sector, and giving more attention to taxing are examples of such responses. But the record illustrates the obvious difficulty faced by the BDG to approach even a minimal degree of financial self-sufficiency.

As a consequence, the BDG has become highly dependent on donor assistance to meet their budgetary obligations. The level of donor assistance has increased about 2.5 times since 1976 and

TABLE 6.5
Summary of Government Finance, Bangladesh, 1975-82 (millions of taka)

Source	1975 Est. Actual	1976 Revised Budget	1977 Revised Budget	1978 Revised Budget	1979 Revised Budget	1980 Revised Budget	1981 Revised Budget	1982 Revised Budget	Compound Growth[j] %
Current Expenditures	**5655**	**6837**	**8216**	**10360**	**11290**	**13419**	**14816**	**18497**	**18**
of which: Food subsidy	916	1006	760	1060	959	1654	1094	1820	6
Jute subsidy	--	--	--	590	588	73	--	--	--
Annual Development Program[a]	**3932[b]**	**8500[a]**	**10057**	**12030**	**16026**	**23300**	**23690**	**27153[b]**	**27**
Agriculture, Rural Devel., & Water Res.	..	..	3145	3490	4688	6658	7833	8820	25
of which: (Fertilizer subsidy)			(640)	(1180)	(1440)	(1250)	(1090)	(1130)	8
(Programs)			(2505)	(2310)	(3248)	(5408)	(6743)	(7690)	31
Industries	..	..	1430	1900	3040	3627	3367	3677	21
Transport, Communication, & Power[c]	..	..	3582	3940	5091	8831	8242	8752	23
Physical Planning[d]	..	..	710	950	1128	1448	1467	1774	19
Social Sectors[e]	..	..	1190	1750	2079	2736	2781	4130	25
Food for Work Program	**—**	**—**	**303**	**492**	**443**	**970**	**1052**	**1604**	**38**
Total Annual Budget	**9589**	**15337**	**18576**	**22882**	**27759**	**37689**	**39558**	**47254**	**24**
Current Revenue	**6837**	**8826**	**9361**	**12446**	**15027**	**18277**	**23430**	**25538**	**21**
of which: Tax revenue	(5479)	(6718)	(7633)	(9842)	(11821)	(14363)	(17818)	(19681)	21
Nontax revenue[f]	(1358)	(2108)	(2328)	(2604)	(3206)	(3914)	(5612)	(5858)	22
Current Surplus or Deficit	**1182**	**1989**	**1745**	**2086**	**3737**	**4848**	**8614**	**7041**	**32**
Overall Surplus or Deficit	**-2750**	**-6511**	**-8615**	**-10436**	**-12732**	**-19412**	**-16128**	**-21716**	**29**
Financed by:									
Capital receipts (net)	-1256	272	449[g]	305[h]	409[h]	-182[h]	-255[h]	1181	
Deficit financing	996	999	-2	923	-2	5	2089	1105	
Transfer from food account	(3010)[b]	-1050	1868	1338	2339	1038	-706	-717	
Foreign grants & loans		6920	6300	7870	9986	14371	15000	18713	
of which: Commodity aid	..	(4350)	(3785)	(4000)	(4750)	(6750)	(8000)	--	
Project aid	..	(1940)	(2515)	(3870)	(5236)	(7621)	(7000)	--	
Errors & omissions	--	--	--	--	--	4190[i]	--	--	

Sources: World Bank, Report No. 3768-BD, March 3, 1982; and Report No. 4277-BD, March 4, 1983, p. 140.

[a] Includes reconstruction and rehabilitation expenditures in 1972/73 and 1973/74. Including current development expenditure.
[b] Breakdown taken from Report No. 4277-BD, p. 143.
[c] Includes scientific research and natural resources.
[d] Includes expenditures on cyclone reconstruction.
[e] Includes health, education, population planning, manpower and employment, social welfare, development boards, and miscellaneous expenditures.
[f] Includes railway receipts and payments from 1973/74 onwards.
[g] Includes Taka 350 m. from accumulated balances of autonomous bodies.
[h] Includes sales of debentures of some autonomous bodies and self-financing by Chittagong Port Trust.
[i] The revised budget of FY 80 projected underspending of Taka 4190 million on the ADP. Actual expenditure under the ADP was Taka 20660 million, and deficit financing of 2990 million was incurred. See text Table 1.10.
[j] Calculated by least-squares trend line, 1975-82, except where data not available.

stood at an estimated Tk. 18.7 billion in 1982 (about $870 million). This represented about 68 percent of the total ADP budget, 40 percent of the total annual budget, and 86 percent of the overall deficit for 1982. The donor support was up slightly from previous years. In 1981, donor assistance amounted to 63 percent of total ADP costs.

These figures understate the total amount of donor assistance since only project and commodity assistance are included. Food aid, which was estimated at $220 million in 1982 is not accounted for in these budget estimates (Table 6.6). If food aid disbursements are combined with the project and commodity assistance, the total will approximate the overall BDG budget deficit.

Donor aid is provided in the general classes of food, commodity, and project aid. The latter involves technical and capital assistance activities which are totally project-oriented. Commodity aid takes on various product forms (fertilizer, cotton, etc.) and is tendered on both loan and grant bases. Foodgrains supplied by donors to support both the ration system and food for work projects come as food aid. The accounting procedures of the BDG are not easily understood and cloud an accurate estimation of the amount of food aid which enters the system, the value of the grains which are sold, and the total revenue used as budget support by the BDG. The World Bank estimates food aid support of Tk. 3.4 billion in 1982 which was 7 percent of the total annual budget for the BDG and 11 percent of the ADP budget. Food aid in 1981 was an estimated Tk. 2.8 billion or 7 percent of the total budget and 12 perent of the ADP.[29]

The complexity of the internal funding arrangements creates close interlinkages between the financing of the ADP and the importance of donor assistance and trade components. Since about one-third of the tax revenues which support the budget come from custom duties, a reduction in either commodity aid or other classes of imports or exports, can cause concomitant reductions in planned tax revenues. Likewise, reductions in planned commodity aid which is sold through the ration system can diminish the revenue position of the BDG. Both have implications for financing ADP programs.*

Shortfalls in any one of the critical revenue sources can cause undue stress on a total system which lacks the capacity to absorb such unpredictable occurrences. The static interrelations within revenue and expenditure budget items over time are also indicative of a financial structure which has little margin for

*Such internal complexities arise from the restricted funding capacity and options available to the BDG which results in considerable part from the limited structure of the nationwide tax base.

TABLE 6.6
Aid Commitments and Disbursements, Bangladesh, 1973-82

	1973	1975	1978	1979	1980	1981	1982[a]	Annual Compound Growth[b]
	(million dollars)							(%)
Commitments (current dollars)								
Food aid	258.8	461.1	138.9	300.6	270.0	202.9	240.0	(-5.7)
Commodity aid	302.1	419.1	426.0	617.4	292.6	336.9	530.0	(-0.5)
Project aid	325.4	391.6	621.9	897.4	633.2	1102.3	1240.0	25.4
Total	886.3	1271.8	1186.8	1815.4	1195.8	1642.1	2010.0	10.0
Disbursements (current dollars)								
Food aid	182.6	282.3	177.9	179.1	374.6	194.1	220.0	3.4
Commodity aid	288.9	375.5	374.3	482.5	377.8	393.1	450.0	5.3
Project aid	79.9	143.4	275.7	368.4	469.8	560.2	540.0	47.4
Total	551.4	901.2	827.9	1030.0	1222.2	1147.4	1210.0	14.7
Commitments (constant--FY 73--dollars)[c]								
Food aid	258.8	219.4	111.4	185.4	140.4	97.6	132.3	(-15.0)
Commodity aid	302.1	242.3	236.9	291.0	123.0	135.8	220.6	(-15.3)
Project aid	325.4	270.8	334.2	414.7	258.9	436.9	484.2	(4.5)
Total	886.3	732.5	682.5	891.1	522.3	670.9	837.1	(-5.9)
Disbursements (constant--FY 73--dollars)[b]								
Food aid	182.6	181.9	142.7	110.5	194.8	93.4	121.3	(-9.3)
Commodity aid	288.9	217.1	208.2	227.4	158.9	158.5	187.3	(-10.4)
Project aid	79.9	99.2	148.1	170.2	192.1	222.0	210.9	23.0
Total	551.4	498.2	499.0	508.1	545.8	473.9	519.5	(-1.3)

Source: World Bank, Report No. 3768-BD, March 3, 1982, p. 82.

[a]Staff estimates.
[b]Estimated by least-squares trend line for period 1973-81.
[c]Commodity aid was deflated by a weighted import price index (FY 73 = 100) of Bangladesh's imports, excluding food grains, crude petroleum, petroleum products, and capital goods imports. Import prices of food grains was used to deflate food aid and the index of international inflation estimated by the Bank's Commodities Division (FY 73 = 100) was used to deflate project assistance.

adjustment and which experiences major difficulty within what otherwise might be relatively routine circumstances.

The incapacity of Bangladesh to marshal adequate levels of internal resources to meet its total budgetary needs creates much of the nation's excessive dependence on outside assistance. As the budget deficit has increased so has the basic dependence. Unfortunately, external response is not always adequate in time or quantity. Given the complex and important role donor imports and assistance play in the total economic system, donor support has played the dual role of both encouraging development, and also contributing to internal economic stress. E G dependence on external assistance is a basic structural proble of the public sector.[30]

Most external assistance is made to Bangladesh on highly favorable, concessionary terms in recognition of the nation's

limited debt servicing capacity. The overall trend in the commitment of assistance has been upward since 1973 (Table 6.6). In general, the increases have reflected the rising needs of Bangladesh as mirrored in its growing budget deficits. The trend in total annual commitment peaked in 1979 $1,815.4 million. Commitments in 1980 fell dramatically but recovered somewhat in 1981. The average annual compound growth since 1973 has been 10 percent, but most of the increase has been associated with rising project aid. Disbursements have followed a similar general trend except for the increase associated with the 1979 foodgrain shortfall which resulted in unusually large food aid disbursements in 1980.

Real dollar commitments peaked in 1979, fell to their lowest level since 1978 during 1980, but increased in 1981. Disbursements in real dollars increased only slightly through 1980 but fell considerably in 1981 to the lowest level since 1975. The trend between 1973-81 shows an annual decline of 1.3 percent. Variations in food aid most often reflect the changing needs of Bangladesh to meet its total projected demand for foodgrains which are greatly influenced by the size of the domestic harvest. The 1981 decline was almost entirely a response to the good local harvest which encouraged reduced donor food shipments. The 1981 level of food aid commitments (measured in constant dollars) was 62 percent less than in 1973 and has declined at an annual rate of 15 percent. The downward trend in the level of commitment should be of concern, particularly in the face of rising population trends and the limited supply response of the agricultural sector. The picture for continued donor help appears to be unsettled at best, and one can reasonably speculate that future donor commitments will be strongly conditioned and, perhaps, restricted by the uncertain performance of both the world and individual national economies and the production of foodgrains worldwide.

The most dramatic shift in external assistance has been toward more project aid commitments which have more than tripled since 1973. The annual growth rate in current dollars for project aid has been 25 percent, while real dollar growth has averaged 4.5 percent annually. In fact, only project aid has shown positive growth in real dollar commitments or disbursals during the period. Both food aid and commodity aid have declined.

The shift toward more project aid has been a welcome emphasis in the view of many donors and quite likely reflects the preferences and pressures of donors to support more technical type programming. It may also be partially indicative of an improved capacity on the part of the BDG to absorb the local costs of project aid. However, the changes will test this capacity, and it could prove to be illusory.

The reasons are related to the requirements normally incorporated into project aid agreements which specify BDG

monetary participation in total project support. BDG project obligations must be met in local currency. Without the generation of domestic revenues, the BDG cannot meet its commitments to donor projects. Additionally, the reduction in food and commodity aid diminishes the ability of the BDG to generate local currency via its taxing of imports and the sale of donor provided commodities in-country, particularly foodgrains through the rationing system. To the extent this limitation is not corrected, committed donor assistance may not be implemented for lack of local currency.

The magnitude of the problem can be illustrated from the increasing size of the pipeline of project aid assistance (Table 6.7). In 1981, the project aid pipeline totalled $2.7 billion and rose to $3.4 billion in 1982. The pipeline was only $2 billion in 1979. The annual growth rate in the value of the pipeline from 1973-81 was 28.8 percent. During the three-year period, 1979-81, Bangladesh disbursed annually only 25, 24, and 26 percent, respectively, of each year's opening pipeline assistance (which is the amount available at year's beginning). Given the $2.7 billion in the pipeline at the start of 1982, disbursements should have reached $702 million to equal the 26 percent disbursement of 1981. Such was not the case. The 1982 disbursals totalled a record $584.3 million but were only 22 percent of the beginning pipeline. As the amount of project aid rises relative to commodity and food aid, the amount of local currency also must rise or project funds will not be utilized and developmental efforts will be curtailed. To complete the cycle, donor assistance funding must be disbursed before the budget requirements shown in Table 6.5 (which include the ADP funding) can be adequately met.[31]

The taka shortage is only one of several critical issues which impinge on the total planning and project implementation scenario. First, concern for taka needs and shortages for donor supported ADP projects has created an environment in which controls predominate and donors have taken individual actions to isolate their projects from the adverse effects of the process, mostly of a form to help create more taka. For example, revolving funds which are replenished automatically, as well as arrangements to credit the local currency receipts of the donor's commodity or program assistance toward the taka requirements of projects supported through their own aid, have been tried.[32] By so doing, the donors have produced an added constraint to the BDG's capability to manage the total development program, and the system is already overcrowded with control and red tape. A principal problem is the presence of a large number of unapproved (but often funded) projects which encumber much valuable time of BDG approving entities.[33] In 1982, 1,726 total projects were included in the ADP process. Of the total, 1,071 were either in "unapproved" or "revised unapproved" status (62 percent). These projects require periodic staff reappraisal before funding can

TABLE 6.7
Summary of External Assistance, Bangladesh, 1972-82 (millions of U.S. dollars)

Fiscal Year	Food Aid			Commodity Aid[a]			Project Aid			Total		
	Committed	(Pipeline)	Disbursed	Committed	(Pipeline)	Disbursed	Committed	(Pipeline)	Disbursed	Committed	(Pipeline)	Disbursed
1972[b]	171.5	(41.9)	129.6	293.6	(156.0)	137.7	146.6	(143.1)	3.5	611.8	(341.0)	270.8
1973	258.8	(118.1)	182.6	302.1	(169.2)	288.9	325.4	(388.6)	79.9	886.3	(675.9)	551.4
1974	155.2	(44.6)	228.7	171.9	(232.9)	108.2	224.2	(488.5)	124.3	551.3	(765.9)	461.3
1975	461.1	(123.4)	382.3	419.1	(276.6)	375.5	391.6	(736.7)	143.4	1271.8	(1136.5)	901.3
1976	240.7	(50.6)	313.5	360.9	(268.4)	369.2	363.0	(974.6)	125.5	965.2	(1293.5)	808.2
1977	143.1	(72.1)	121.6	304.3	(319.8)	252.9	305.3	(1121.3)	158.6	752.7	(1513.1)	533.1
1978	138.9	(33.1)	177.9	426.0	(371.6)	374.3	621.9	(1467.4)	275.7	1186.7	(1872.1)	827.8
1979	300.6	(154.6)	179.1	622.9	(512.0)	482.5	897.4	(1936.5)	368.4	1821.0	(2603.2)	1030.0
1980	270.0	(50.0)	374.6	292.6	(426.8)	377.9	633.2	(2159.9)	469.8	1195.9	(2636.6)	1222.4
1981	202.9	(58.8)	194.1	336.9	(370.6)	393.0	1102.3	(2702.1)	560.1	1642.1	(3131.5)	1147.2
1982	218.1	(46.4)	230.5	491.5	(444.2)	421.4	1233.5	(3351.3)	584.3	1946.6	(3842.9)	1236.2

Sources: World Bank, Report No. 3768-BD, March 3, 1982, pp. 199 and 85; and Report No. 4277, March 4, 1983, p. 136.

Note: The data shown in parentheses indicate the annual closing pipeline (i.e, committed aid not yet disbursed).

[a]Includes cash aid.
[b]Data for 1972 refer to the period from December 17, 1971 to June 30, 197[illegible].

proceed, and taka requirements must be guaranteed before projects can go forward for approval and implementation.[34] The total administrative burden far exceeds the capacity of the BDG administrative structure. The World Bank estimates that twenty projects annually is a reasonable number to be cleared through the planning division's evaluation process.[35]

A further budgetary complication is introduced by the persistent delays in releasing funds to approved ADP projects and current budget needs. The pattern of final release is commonly skewed to the latter quarters of the year. Program directors throughout the system face the problem of implementing programs without timely budget allocations. Some units which have revenue producing capacity are able to meet some of their immediate needs by utilizing this money against the allocations due from the BDG. But, the number of units that can make these adjustments is limited as is the impact this flexibility provides in solving the overall issue. The more common consequence of delayed fund releases is diminished program activity, even to the point of postponed salary payments of up to several months.

The introduction of a core program concept in 1983 offers the potential to alleviate some of the effortful factors which now burden the budget process. The core encompasses critical projects which are to be protected from funding vagaries by guaranteeing fund availability and disbursement. This subgroup of priority projects are granted privileged status on the basis of their technical and economic worth. Funds authorized in the ADP for core projects will not be constrained by fluctuating (reduced) total resource availability which in the past has been assessed across-the-board to all projects. Furthermore, release of funds will be streamlined and funds made available in accordance with project needs and requirements. For 1983, the BDG designated about 500 projects for core priority from a total of around 1100. Reduction of the overall number of projects to 1100 from prior year levels of around 1500 was an added benefit which came with the core programming concepts.

The budget needs of the BDG are in the best sense a vicious cycle which involves a mixture of interrelationships with their apex focused on external assistance. It is clear to see why the early plans of the BDG gave priority to freeing the nation of this dependence. It is equally clear that success has not been achieved. Efforts to maintain or restructure foreign donor commitments must, of necessity, encounter serious issues. Yet, one cannot ignore the obvious dependence of the BDG on such assistance nor the fact that this will continue for sometime. Pressures are now building to reduce the ratio of project to food/commodity aid in the interest of providing taka-generating sources for the BDG. This process, too, is not simple. Shifts from project to commodity aid by donors may come at the expense of planned technical programs which will be delayed or cancelled,

depending on the magnitude and longevity of increased commodity funding.

A critical component to these interdependencies is the ability of the BDG to marshall domestic resources to better meet the nation's developmental obligations. Success must be achieved if the long run viability of Bangladesh development is to be realized. But the process will require hard policy choices and fiscal/monetary discipline not heretofore in evidence. The BDG has taken some initial steps to streamline portions of the tax system. Among the changes are a simplification of collection procedures for custom, excise, and sales taxes; modifications in the value-added taxes, and a rewrite of the income tax structure to include reductions in the highest tax rates and a broadening of the tax base. Restraint also was shown by reductions in the 1982 ADP. These moves are indicative of the extensive reforms which are needed

Concessional assistance has historically reduced the pressure on the BDG to face the issues of internal resource mobilization and the high priority of agriculture in the development process. The BDG has had a certain autonomy to pursue its own objectives and to reinforce system weaknesses which added strength to the government position. In the total process, the last ten years have brought an institutionalization of programs and their impacts which have intertwined concessional aid and public budget processes in a unique form of dependency which coexists with the strong commitment to widespread subsidy. As Clay has observed:

> The scale of foreign assistance to the Bangladesh economy creates problems of economic accounting so far little explored. In an almost Alice in Wonderland situation subsidies are metamorphosed into revenue raising devices. There is scope for conceptual misunderstanding that alone can lead analysts to make recommendations and administrators to follow courses of action which have the opposite effect to that intended . . . a close inspection of agricultural sector expenditures raises questions about the seriousness of the commitment to agricultural development. Food aid has been part of a total foreign assistance package that seems to have made it possible to put off difficult decisions on restructuring the allocation of resources between departments and agencies in the agricultural sector to have a greater impact on production.[36]

Of added concern is the postponement of changes in intersectoral allocation which, likewise, have not been addressed.

Debt Management

Despite an otherwise serious budgetary condition, Bangaldesh has managed to maintain a rather reasonable external public debt status. As of June 30, 1982, Bangaldesh was current in its principal and interest payments to all debt holders and faced a debt servicing level which appears manageable. The annual service obligation, including both principal and interest, was $87 million in 1982. Projections are that the obligation will reach around $280 million annually by the late 1980s.[37]

The external public debt of Bangladesh is composed of an extensive list of lending nations as well as a variety of credit institutions (Table 6.8). Multilateral and bilateral loans represented 97 percent of the $6.6 billion in outstanding external debt as of June 30, 1982. The amounts were divided about equally between the two sources. The largest debt holder was the International Development Agency (IDA), whose aggregate outstanding loans amounted to $2.14 billion or 32 percent of the total. The Asian Development Bank (ADB) was the second largest multilateral lender with $748 million outstanding. Small amounts have been obtained from the OPEC Special Fund and the Islamic Development Bank, but these amounts along with other multilateral agencies are small by comparison to those of IDA and the ADB.

Bilateral loans were held by twenty-six nations in 1982. The United States held $872 million which was 29 percent of the bilateral aid and 13 percent of the total external debt outstanding. Japan held $952 million. There are no other major debt holders, although the amounts held by the USSR and by Saudi Arabia were noticeably higher than most other creditors.

The debt management issues for Bangladesh are kept somewhat in check and made easier to control by two factors. First, the high proportion of assistance that comes on grant terms has significantly limited the external debt obligation of the nation. The current outstanding debt represents only about 50 percent of the total external assistance which has been placed in Bangladesh in various forms by donor agencies since 1973. Even for these obligations, a high proporition is held by IDA and ADB which do not assess even minimal interest costs, but merely low-cost service charges. Obviously, the resultant repayment obligation is lower than would otherwise be the case. Secondly, management of the external debt has become a part of the total public finance issue, albeit, a relatively small proportion. Nonetheless, the debt retirement process has benefited from prior BDG arrangements with the International Monetary Fund (IMF) to provide special financing under the extended fund and supplementary financing authorizations. Negotiations were concluded in October 1980 which entitled Bangladesh to supplemental support of about $300 million annually to support the total budget effort. However, after some drawdown in 1981, the entitlement was withdrawn by IMF in March, 1982 in reaction

TABLE 6.8
External Public Debt Outstanding, Including Undisbursed Debt Repayable in Foreign Goods and Currency, Bangladesh, June 30, 1982

Type of Creditor and Creditor Country	Disbursed	Undis-bursed	Total
	-------(thousand dollars)--------		
Suppliers Credits			
Austria	--	295	295
Netherlands	8943	653	9596
Pakistan	--	7013	7013
Singapore	3088	--	3088
Turkey	500	--	500
United Kingdom	2170	--	2170
USSR	36734	4727	41461
Yugoslavia	49101	10478	59579
Total Suppliers Credits	**100536**	**23166**	**123702**
Financial Institutions			
Austria	6766	--	6766
France	19557	21860	41417
India	9079	3761	12840
Netherlands	--	553	553
United Kingdom	9447	18282	27729
Total Financial Institutions	**44849**	**44456**	**89305**
Multilateral Loans			
Asian Development Bank	232668	515497	748165
EEC	43413	4587	48000
IBRD	54896	--	54896
IDA	1182729	957541	2140270
IMF Trust Fund	135972	--	135972
International Fund ARG (IFAD)	15232	78326	93558
Islamic Development Bank	35206	38000	73206
OPEC Special Fund	52918	45634	98552
Total Multilateral Loans	**1753034**	**1639585**	**3392619**

Type of Creditor and Creditor Country	Disbursed	Undis-bursed	Total
	-------(thousand dollars)--------		
Bilateral Loans			
Abu Dhabi	12893	3451	16344
Belgium	19850	9231	29081
Bulgaria	346	750	1096
Canada	--	20320	20320
China	20103	46832	66935
Czechoslovakia	27148	4514	31662
Denmark	12447	10018	22465
Finland	--	5409	5409
France	17866	41582	59448
German--Dem. Rep.	5758	--	5758
Germany--Fed. Rep. of	1622	--	1622
Hungary	9312	16130	25442
India	49782	950	50732
Iran	12500	--	12500
Iraq	49056	68745	117801
Japan	809714	142750	952464
Kuwait	60706	60523	121229
Netherlands	15954	--	15954
Poland	2014	50046	52060
Romania	23878	38198	62076
Saudi Arabia	42665	123075	165740
Switzerland	5263	--	5263
Turkey	2683	--	2683
United Arab Emirates	62668	23155	85823
United States	816608	55285	871893
USSR	27275	177392	204667
Total Bilateral Loans	**2108111**	**898356**	**3006467**
TOTAL EXTERNAL PUBLIC DEBT	**4005530**	**2605563**	**6612093**

Source: World Bank, Report No. 4277, March 4, 1983, p. 138.

Notes: 1) Only debts with an original or extended maturity of over one year are included in this table; and 2) debt outstanding includes principal in arrears but excludes interest in arrears.

to monetary policies of the BDG which were contrary to IMF conditions. Subsequent negotiations were not successful and IMF has withdrawn the Bangladesh entitlements to the fund. An optional one-year standby credit has been proposed, but no formal discussions have been scheduled. Obviously the loss of these non-commodity resources impacts on all phases of the BDG's public finances and particularly has reduced its flexibility in meeting the wide variety of budgetary needs.

Summary

The public sector occupies a dominant position in the operation of the economy of Bangladesh and has a major impact on the agricultural sector. Since independence numerous reorganizations have occurred in the public sector which has reduced the number of ministries, but not the number of BDG functions or organizational units. The public bureaucracy serving agriculture continues to be extensive.

Under the Constitution, the government is a unitary form with an elected president, a council of ministers, and an elected parliament. These institutions were temporarily set aside with the establishment of martial law in March, 1982 but prognostications are for return to constitutional rule. The offices of government from the ministry level downward continue to operate in much the same administrative scheme as before.

The system has centralized and functionally decentralized levels of administration which impact on agriculture. The decentralized units include an extensive list of public corporations, institutes, and boards, which are centrally managed by the Ministries of Agriculture, Industries and Commerce, and Food, and which, along with the Ministries of Communications and Finance and Planning, constitute the ministerial milieu of most relevance to the agricultural sector. A formal civil service covers most employees of the public sector.

Financing the public sector and its developmental programs is made difficult by the inadequate domestic base for generating public revenues. Current BDG revenues are normally sufficient to meet current expenditures, but financing the Annual Development Plan (ADP) relies very heavily on donor support. Expenditures have increased 18 percent and revenues 22 percent annually, in current dollars. There have been no significant shifts in expenditures among budget items. Funds to pay for agricultural services have consistently represented 1 to 2 percent of the current expenditures annually since 1975.

About 75 percent of BDG revenues come from tax revenues. Custom and excise duties plus sales taxes are the most important sources of public income. The tax system suffers from several inadequacies which limit the number of revenue alternatives. The

nontax revenue base has been adversely affected by the generally inadequate performance of the fifty major BDG public corporations. Many have shown operating losses necessitating BDG support which in 1982 totalled about Tk. 1.2 billion.

The Annual Development Plan reached Tk. 30 billion in 1982 (later reduced to Tk. 27.2 billion) and reflects an annual growth rate of 27 percent since 1975. Agriculture has received a consistent share (about 32 percent) during the period, which is the largest allocation to any major sector, but a meaningful proportion of this is for subsidies for fertilizer and water. The proportion of the ADP going to agriculture is considerably less than the sector's proportional contribution to the GDP. The constancy of fund allocations among sectors, both in the current budget and the ADP, depict a general stability of priorities.

The recurring budget deficit in meeting the total public sector services and developmental needs has made Bangladesh highly dependent on external assistance. The commitments of donors have shown a definite trend toward increased project aid and reduced food and commodity aid, both in current and real value. Total aid has remained about constant in real terms.

The trend toward increased project aid has created internal financing difficulties for the BDG. Most project aid requires local currency to finance local costs, and the shortage of domestically mobilized resources has limited the ability of the BDG to produce the needed taka to take total advantage of the available project assistance.

The debt position of the BDG is one of the few financial management areas which is not critical. Bangladesh is current in its principal and interest payments, and projections are favorable. Most of the external debt is held by IDA and ADP. There are twenty-six bilateral donors who hold 45 percent of the outstanding debt. The United States and Japan hold the largest amounts among the bilateral group.

Footnotes

[1]The nationalized industries were strongly oriented to agriculture and included jute and cotton textiles, sugar, iron and steel, engineering and shipbuilding, chemicals, fertilizers, pharmaceuticals, oil, gas and minerals, paper, food, and forest-industries. See: Muhiuddin Khan Alamgir, Development Strategy for Bangladesh, (Dhaka: Center for Social Studies, 1980), p. 64.

[2]The conditions which finally led to hostilities between East and West Pakistan were complicated and involved relationships which developed over a period of more than twenty years. For a treatise on this background see: Rehman Sobhan and Muzaffar Ahmed, Public Enterprise in an Intermediate Region: A Study in the Political Economy of Bangladesh, Bangladesh Institute of Development Studies, Dhaka, 1980; and Najmul Adedin, Local Administration and Politics in Modernizing Societies -- Bangladesh and Pakistan, (Dhaka: University Press, 1973).

[3]For an extensive study of the process as seen from the planner's viewpoint, see: Nural Islam, Development Planning in Bangladesh: A Study in Political Economy, (Dhaka: University Press Limited, 1977).

[4]Richard Nyrop et al., Area Handbook for Bangladesh, Area Studies of the American University, Washington, D.C., 1975, p. 73.

[5]The discussion in this section proceeds on the basis of constitutional organization and functions existing prior to the establishment of martial law by military takeover on March 24, 1982. Statements have been made that the government will be returned to civilian rule, likely within two years.

[6]Decentralized administration is delineated into two forms, territorial and functional. The latter form which is referred to here, means giving power of decision making to technical or professional units of an organization regardless of physical location. For a full discussion of the concepts see: Ali Ahmed, Basic Principles and Procedures Administrative Organization: Bangladesh, National Institute of Local Government, Dhaka, June, 1981.

[7]Data for the following sections on ministerial organizations and functions were obtained from personal interviews with numerous BDG personnel within each division.

[8]The existing thana level organization is currently in the process of change based on the new role being assigned to thana administration by the martial law government. It is not entirely clear what specific changes will occur. Also, the changes occur only as thanas are upgraded and this staging will take at least one year. The initial changes, as already announced for upgraded thana, were discussed earlier in this chapter.

[9]The MOF is composed of two divisions: (1) Food; and (2) Relief and Rehabilitation. This discussion deals only with the Food Division.

[10]Information provided by Food and Agricultural Division, USAID.

[11]Estimate provided by Food and Agriculture Division, USAID.

[12]Government of Bangladesh, Annual Report 1978-79, Ministry of Food, July, 1979, p. 2.

[13]The author's estimate based on information in the Bangladesh 1980 Statistical Yearbook is about 1.1 million.

[14]There are no analyses of the current civil service in Bangladesh. But for a comprehensive review of the history and operation of the predecessor system in Pakistan see: Ali Ahmed, Role of Higher Civil Servants in Pakistan, National Institute of Public Administration, Dhaka, June, 1968.

[15]Ali Ahmed, Basic Principles and Practices of Administrative organization: Bangladesh, National Institute of Local Government, Dhaka, June 1981.

[16]There is a body of literature regarding the origin, processes, and impacts of corruption both in developed and developing countries which examines the issues in a systematic and unemotional manner. As examples see: James C. Scott, "An Essay on the Political Functions of Corruption," Asian Studies, Vol. V. No. 3, 1977, and David H. Hayley, "The Effects of Corruption in Developing Nations," Western Political Quarterly, XIX, December, 1966.

[17]The 1982 ADP budget was reduced recently to Tk. 27.2 billion by the BDG in response to IMF and donor encouragement. The exact breakdown of the new budget is not yet available. Even at this reduced level, the 1982 ADP is still the highest to date.

[18]Government of Bangladesh, The Second Five Year Plan, 1980-85, May, 1980.

[19]As will be demonstrated later, only 17 percent of the disbursed project assistance from foreign aid has gone to agriculture.

[20]World Bank, Report No. 3768-BD, p. 3.

[21]For a more detailed discussion of these points, see: John W. Mellor, The Economics of Agricultural Development, (Ithaca, New York: Cornell University Press, 1966), p. 52.

[22]These taxes were revised beginning July, 1982 as follows:

Up to 2.0 acres:	No tax
2.1 to 5.0 acres:	Tk. 231
5.1 to 10.0 acres:	TK. 531
10.1 to 15.0 acres:	Tk. 531
15.1 to 25.0 acres:	Tk. 1481
Over 25.0 acres:	Tk. 2641

See: A.M.A. Muhith, "Annual Budget Speech, 1982-83" (Part II), Ministry of Finance and Planning, June 30, 1982, p. 21.

[23]World Bank, Report No. 3768 BD, p. 208.

[24]These data are all obtained from: Ministry of Finance, Budget Estimates of Autonomous Bodies, 1982-83.

[25]World Bank, Report No. 3768-BD, p. 110.

[26]Ibid, p. 112.

[27]Reported in Bangladesh Times, May 17, 1982.

[28]Discussions were initially reported in the New Nation, May 13, 1982. p. 1.

[29]World Bank, Report No. 3768-BD, p. 30.

[30]For a cogent analysis if the issues related to Bangladesh's dependence see: Rehman Sobhan, The Crises of External Dependence, (Dhaka: University Press Ltd., 1982).

[31]An astute reader will have notice that the external assistance level stated in Table 6.5 as needed to offset the budget deficit do not equal the disbursements of aid for the appropriate period, as should logically happen. This discrepancy traditionally occurs and is the result of inadequate planning which produces inaccurate budget estimates and, when combined with systems of inadequate monitoring and expenditure controls, leads to high levels of uncertainty regarding budgetary status during the year plus recurring budget revisions.

[32]World Bank, Report No. 3768-BD, p. 26.

[33]Unapproved projects are defined as projects where "approval of competent authority is awaited, but in condition of priority of unavailability of foreign aid, expenditures are required to be incurred urgently."

[34]World Bank, Report No. 3768-BD, p. 127.

[35]World Bank, Bangladesh: Current Economic Position and Short Term Outlook, Report No. 2870-BD, March 21, 1980. p. 155.

[36]E. J. Clay, "Food Aid and Food Policy in Bangladesh," The Bangladesh Journal of Agricultural Economics, Volume I, Number 2, December 1978.

[37]World Bank, Report No. 4277-Bd, Table 4.2. Includes only debt with an original or extended maturity date of over one year.

CHAPTER 7
FOREIGN DONOR PROGRAMS IN AGRICULTURE

"Creative human action is still a core characteristic of the transition to economic growth. Without creativity, capital formulation would be largely wasted; fruitful private projects would not appear in large numbers; and government projects would be mismanaged, burdening the economy rather than furthering economic growth."

Everett E. Hagen
Massachusetts Institute of Technology

Introduction

The precarious balance of payments and critical budget situation subject Bangladesh to extreme dependence on foreign donors. The fact that so many nations have sustained such high levels of assistance over such an extended period of time is unusual, especially since Bangladesh has no political or strategic importance to other nations except possibly its immediate neighbors. Assistance has come mostly for humanitarian reasons.

The debt obligations of Bangladesh held by donors is only indicative of the very substantial commitments to assistance which have been made since 1971 by wealthier nations. The list of donor nations is long and their bilateral collaboration in Bangladesh is routinely multiplied through concomitant membership in multilateral agencies. For example, all nations which constitute the current list of contributing members to the Asian Development Bank (ADB) also have had bilateral donor relationships with Bangladesh. Likewise, all nations with bilateral programs in Bangladesh are among the 135 nations which support the World Bank, except for the Eastern Block nations.

Donor Participants

Since 1971, thirty-five nations, including those from OPEC, the centrally planned block, and the West, plus ten multilateral

agencies, and a number of private institutions have given loan and grant assistance to Bangladesh.[1] The total commitment through June 30, 1982 has been $12.7 billion of which $5.6 billion (44 percent) have been in grants (Table 7.1). Of the total committed, $9 billion was disbursed as of July 1, 1982. The average annual disbursement for the ten and one-half year period approximates $857 million in total aid.[2] About $4.6 billion or 52 percent of the total was disbursed since 1979. In 1982, $1.2 billion was released which was the largest annual disbursement to date.

Slightly more than half (52 percent) of donor commitments has been in the form of commodity and food aid. However, of the total disbursements to date, 68 percent has been in these two categories. Disbursement of food aid has been very rapid as 98 percent of the commitment has been utilized. Commodity aid has likewise been utilized expeditiously (89 percent). Project aid has been retarded in the distribution process as only 47 percent has been used.[3] The lag in disbursement of project aid is a reflection of the "taka shortage" problem discussed in Chapter 6, but this is not the sole explanation.

The actual sectorwide disbursement of project aid is at considerable variance with the ADP sector allocations reported in Chapter 6 (Table 6.5). For example, the activities related to agriculture, rural development, and water and flood control have received 17 percent of the project aid since 1972. Transport and industry have received 24 percent and 19 percent, respectively.[4] The ADP allocations for the three sectors are about 32 percent, 14 percent, and 11 percent by comparison. Given the intricacies of public accounting in Bangladesh, it is difficult to trace fully comparative figures through the system. Portions of the total donor disbursements, which include food and commodity aid in addition to the project aid summarized here, are allocated to the agricultural sector to support the ADP. The sectorwide breakdown of these nonproject aid disbursements is not published which makes it impossible to derive estimates that are entirely comparable with the ADP. But it does appear that agriculture is treated with less favor by the BDG when viewed in terms of actual project aid disbursements to the sector than was suggested earlier by the ADP allocations.

DAC nation bilateral aid has accounted for 50 percent of the total assistance to Bangladesh since 1972, and 60 percent of their assistance has been initially offered as grants.[5] The major DAC donors have been the United States, Japan, Federal Republic of Germany, Canada, and the United Kingdom. Sixteen nations are included in the DAC category. All of the assistance from Germany, Canada, United Kingdom, Switzerland, Sweden, Finland, and Belgium has been tendered as grants. Commonly, among these nations, assistance is initially negotiated as loans, but the funding is subsequently changed to grant status. With

TABLE 7.1
Summary of Commitment and Disbursement of Foreign Aid, Bangladesh, December 17, 1971 to June 30, 1982 (million dollars)

Donor Country/Agency	Commitment			Disbursement			Pipeline on July 1, 1982 (4 - 7)	% of Disbursement Over Total Availability
	Grant	Loans	Total (2 + 3)	Grant	Loans	Total (5 + 6)		
1	2	3	4	5	6	7	8	9
A. DAC Countries:								
1. Australia	168.5	..	168.5	165.5	..	165.5	3.0	98.2
2. Belgium	5.9	38.7	44.6	5.9	26.7	32.6	12.0	73.1
3. Canada	657.8	16.0[a]	673.8	564.1	16.0	580.1	93.7	96.1
4. Denmark	65.2	57.7[b]	122.9	49.1	44.4	93.5	29.4	76.1
5. Finland	4.7	8.6[a]	13.3	3.5	2.3	5.8	7.5	43.6
6. France	97.7	146.6	244.3	69.6	77.4	147.0	97.3	50.2
7. F.R.G.	342.3	267.8	610.1	201.1	267.8	468.9	141.2	76.8
8. Italy	5.2	..	5.2	5.2	..	5.2	..	100.0
9. Japan	235.8	911.5	1147.3	209.9	757.6	967.5	179.8	94.3
10. Netherlands	289.1	71.2	360.3	203.6	71.2	274.8	85.5	76.3
11. Norway	165.0	..	165.0	135.8	..	135.8	29.2	82.3
12. New Zealand	3.2	..	3.2	3.2	..	3.2	..	100.0
13. Sweden	244.0	6.4	250.4	214.7	6.4	221.1	29.3	88.3
14. Switzerland	26.0	10.0	36.0	14.8	10.0	24.8	11.2	68.9
15. United Kingdom	538.3	62.3	600.6	348.0	62.3	410.3	190.3	68.3
16. United States	920.2	778.8	1699.0	756.1	723.3	1479.4	219.6	87.1
Total	**3768.9**	**2375.6**	**6144.5**	**2950.1**	**2065.4**	**5015.5**	**1129.0**	**81.6**
B. International Agencies:								
1. E.E.C.	275.2	48.0	323.2	228.5	43.5	272.0	51.2	84.1
2. UNICEF	15.8	..	150.8	141.1	..	141.1	9.7	93.6
3. UN System	629.4	..	629.4	591.7	..	591.7	37.7	94.0
4. IVA	106.0	..	106.0	106.0	..	106.0	..	100.0
5. A.D.B.	..	808.9	808.9	..	223.4	223.4	585.5	27.6
6. I.D.A.	..	2099.8	2099.8	..	1104.5	1104.5	995.3	52.6
7. I.D.B.	..	86.1	86.1	..	48.1	48.1	38.0	55.9
8. IFAD	0.2	100.5	100.7	0.2	18.7	18.9	81.8	18.8
9. OPEC	..	98.9	98.9	..	53.3	53.3	45.6	53.9
10. Ford Foundation	9.5		9.5	8.9	..	8.9	0.6	93.7
Total	**1171.1**	**3242.2**	**4413.3**	**1076.4**	**1491.5**	**2567.9**	**1845.4**	**58.2**

C.	**OPEC Countries:**							
1.	Iran	..	12.5	12.5	..	12.5	12.5	..	100.0
2.	Iraq	8.4	127.0	135.4	8.4	58.3	66.7	68.7	49.2
3.	Kuwait	..	123.6	123.6	..	61.0	61.0	62.6	49.3
4.	Libya	1.0	..	1.0	1.0	..	1.0	..	100.0
5.	Saudi Arabia	375.5	165.0	540.5	292.0	41.2	333.2	207.3	61.6
6.	U.A.E.	17.2	96.2	113.4	17.2	71.8	89.0	24.4	78.5
Total		**402.1**	**524.3**	**926.4**	**318.6**	**244.8**	**563.4**	**363.0**	**60.8**
D.	**Centrally Planned Countries:**								
1.	Bulgaria	1.9	8.1	10.0	1.9	0.5	2.4	7.6	24.0
2.	China	1.0	83.4	85.4	1.0	25.9	26.9	58.5	31.5
3.	Czechoslavakia	..	46.2	46.2	..	41.1	41.1	5.1	88.9
4.	G.D.R.	1.8	8.1	9.9	1.8	8.1	9.9	..	100.0
5.	Hungary	..	10.0	10.0	..	10.0	10.0	..	100.0
6.	Poland	1.3	51.2	52.5	1.3	1.1	2.4	50.1	4.6
7.	Romania	0.1	80.4	80.6	0.1	43.8	43.9	36.7	54.4
8.	U.S.S.R.	34.6	325.0	359.6	34.6	134.9	169.5	190.1	47.1
9.	Yugoslavia	0.9	62.8	63.7	0.9	52.2	53.1	10.5	83.3
Total		**41.6**	**676.2**	**717.8**	**41.6**	**317.6**	**359.2**	**358.6**	**50.0**
E.	**Other Sources:**								
1.	Australia	..	49.2[c]	49.2[c]	..	49.2[c]	49.2[c]	..	100.0
2.	India	185.6	141.1	326.7	183.[illegible]	135.2	319.0	7.7	97.7
3.	Japan	..	1.1	1.1	..	1.1	1.1	..	100.0
4.	Pakistan	33.5	..	33.5	33.5	..	33.5	..	100.0
5.	Thailand	0.1	..	0.1	0.1	..	0.1	..	100.0
6.	Turkey	0.8	4.1	4.9	0.8	4.1	4.9	..	100.0
7.	GEC (UK)	..	23.5	23.5	..	23.5	23.5	..	100.0
8.	Moscow-Norodny Bank	..	15.4	15.4	..	15.4	15.4	..	100.0
9.	NGB (UK)	..	1.4	1.4	..	1.4	1.4	..	100.0
10.	B.C.C.I.	..	6.5	6.5	..	6.5	6.5	..	100.0
11.	Suppliers Credit	..	81.9	81.9	..	30.0	30.0	51.9	36.6
Total		**220.0**	**324.0**	**544.2**	**218.2**	**266.5**	**484.7**	**59.6**	**89.1**
GRAND TOTAL		**5603.6**	**7142.6**	**12745.2**	**4604.8**	**4385.7**	**8990.5**	**3755.7**	**70.5**

Source: Ministry of Finance, **Flow of External Resources into Bangladesh** (as of June 30, 1982), External Resources Division, December 5, 1982, pp. 89-91.

[a]Loans already converted into grants. [b]All but two loans converted into grants. [c]Loan already repaid.

these types of transfers included the DAC nations as a group provided 67 percent (not 60 percent) of their aid as grants.

The multilateral agencies have supplied 35 percent of the total foreign assistance since 1972. IDA has been the largest multilateral donor, and, together with the ADB, they have committed 66 percent of the total from international agencies. All IDA/ADB aid has been loan funded, but on highly concessional terms which involve extended repayment periods and only minimal service charges. The organizations of the United Nations (including UNICEF) gave $780.2 million (18 percent), all of which was grant-funded. All of the OPEC community assistance has come since 1977 and has mainly supported the Bangladesh Gas Project, the East West Power Transmission Interconnector, the Khulna Power Station, and the Kurmitola International Airport.

The nations of OPEC and those from the Eastern Block have contributed 7 percent and 6 percent, respectively, of the bilateral aid. Saudi Arabia has supplied 58 percent of the OPEC assistance which, in the aggregate, is 43 percent loan-funded. The OPEC nations have supported both commodity and project needs in Bangladesh. For example, Saudi Arabia assisted railway improvements in 1977 ($50 million), Iran loaned $12.5 million in 1975 for the Ashuganj (Zia) Fertilizer Factory, and Kuwait aided the Manu River Project in 1975 and power development on four occasions from 1975-81.

The U.S.S.R. has been the largest East Block donor. Assistance from the centrally planned nations has been 94 percent loan-funded on fairly concessional terms which are slightly less liberal than those offered by the DAC and OPEC nations. Most of the East Block assistance has been capital transfers in the form of commodity loans, export credits, and infrastructural development. Yugoslavia, in particular, gave early support to power development after independence. More recently (1981), Hungary has assisted with improvements in textile machinery and railway locomotive power.

The large number of donors and the huge amounts of money they contribute to underwrite developmental efforts in Bangladesh translate into a significant volume of projects and activity. From loan funds alone, the External Resources Division of the BDG recorded 321 projects through June 1982. No estimate of grant projects is available, but the number is likely far greater than those which are loan-funded, as evidenced by the large number of projects processed annually in the ADP.

Given the vastness of the donor effort in Bangladesh, it becomes impractical to summarize the postindependence programs of the entire complement of nations. Consequently, the digest of specific donor activity which follows will be limited generally to those nations and institutions with the largest dollar programs[6] and will give most emphasis to recent years.

Multilateral Assistance

The World Bank/International Development Association (IDA)

IDA is the main segment of the World Bank operating in Bangladesh and, additionally, is the most important donor providing assistance to the country. As of June 30, 1982, IDA credits to Bangladesh aggregated to $2.1 billion, which represents 16 percent of the total donor assistance received since 1972 (Table 7.1). Loans are made on highly concessionary terms with ten year grace periods, fifty years maturity, and no interest. A 0.75 percent service charge is made on the disbursed portion of each credit annually.[7]

Within the lending portfolio of IDA, Bangladesh assistance is among the highest provided to any country worldwide. Through June 30, 1980, IDA had awarded $1.3 billion in developmental credits to Bangladesh. This amounted to 7.1 percent of IDA's total lending support. Only India, with 40.8 percent of the total lent by IDA, has received more assistance than Bangladesh.[8]

Through 1982, IDA has supported seventy-five projects in Bangladesh since independence (Table 7.2).[9] The projects reflect a wide variety of needs and support by IDA of a scopious portfolio of projects. In 1980 and 1981, IDA approved seventeen projects in Bangladesh totaling $502 million. Briefly, the projects were the following:[10]

Irrigation/Low Lift Pump ($37 million). This project provided for the installation of 8,500 new low-lift pumps; the rehabilitation of 5,000 unserviceable pumps; the initiation of pump sales to farmers with the provision of commercial credit; tools, equipment, and transport vehicles for BADC; and a training program for pump mechanics and operations. The project has a four-year life.

Small-Scale Drainage ($25 million). IDA financed the construction of permanent structures and improvement of earthworks to supplement road and irrigation schemes constructed under the Food for Work Program. The project is to be carried out over the entire country with the exception of the Northwest region and Chittagong district south of the Karnaphuli river. It is expected that about 350,000 acres of land will be made more productive. Cofinancing ($3 million) is being provided by CIDA (Canada).

Fertilizer Import ($25 million). With this IDA credit, a portion of the import requirements of fertilizer for fiscal 1981 was financed.

TABLE 7.2
Loan-Supported Projects by International Development Association, Bangladesh, 1972-82 (million dollars)

Year	Project Description	Principal Amount	Year	Project Description	Principal Amount	Year	Project Description	Principal Amount
1972	Coastal Area Rehabilitation & Cyclone Protection	25.0	1976	Technical Assistance Loan	7.5	1980	Small-Scale Drainage	25.0
			1976	Rural Development	16.0	1980	Offshore Afforestation	11.0
1972	Chandpur Irrigation	13.1	1976	Shilpa Bank	25.0	1980	Jute Industries Rehabilitation	20.0
1972	Northwest Region Deep Tubewell	14.0	1977	Commodity Loan	75.0	1980	Fertilizer Industries Rehab.	29.0
1972	Telecommunication	7.7	1977	Deep Tubewell	16.0	1980	Second Chittagong WASA	20.0
1972	Commodity Loan	50.0	1977	Muhuri Irrigation	21.0	1980	Second Education	40.0
1973	Small-Scale Industries	3.0	1977	Extension and Research	10.0	1980	Fertilizer Import-II	25.0
1973	Irrigation Engineering	0.4	1977	Inland Water Transport	5.0	1980	Third Small-Scale Indus. (SDR)	26.7
1973	Chittagong WASA	7.7	1977	Commodity Loan	75.0	1980	Education (Primary)	40.0
1973	Dhaka WASA	14.4	1978	Jute Research	21.0	1980	Commodity Loan (SDR)	49.5
1973	Food Storage	23.5	1978	Food Security	25.0	1981	Agriculture Credit (SDR)	32.6
1973	Education	22.6	1978	Small-Scale Industries	7.0	1981	Sakhrabad Gas	85.0
1973	Highway	25.7	1978	Agriculture Research	6.0	1981	Fertilizer Transport	25.0
1973	Technical Assistance	4.0	1978	Flood Control & Water Resources	19.0	1981	Credit to Bangladesh Shilpa Bank	50.0
1973	Cereal Seeds	7.5	1978	Commodity Loan	75.0	1981	Technical Assistance	16.0
1974	Commodity Loan	50.0	1978	Technical Assistance	10.0	1982	Agricultural Credit (SDR)	32.6
1974	Second Telecommunication	20.0	1978	Fisheries Development	6.0	1982	Xth Import Program (SDR)	87.4
1974	Commodity Loan	75.0	1979	Vocational Training	25.0	1982	Chittagong Fertilizer (SDR)	12.8
1974	Past-Debt Liabilities	37.5	1979	Greater Khulna Power	28.0	1982	Textile Industry Rehab. (SDR)	26.1
1975	Inland Water Transport	8.7	1979	Dhaka WASA	22.0	1982	Drainage/Flood Control (SDR)	24.0
1975	Ashuganj Fertilizer	33.0	1979	Ashuganj Fertilizer	29.0	1982	Ag. Extension & Research (SDR)	23.2
1975	Population Control	15.0	1979	Second Population	32.0	1982	Ashunganj Thermal Plant (SDR)	52.7
1975	Barisal Irrigation	27.0	1979	Fertilizer	25.0	1982	Rural Electrification (SDR)	36.0
1975	Commodity Loan	100.0	1979	Second Highway	10.0	1982	Chittagong Port (SDR)	54.0
1976	Karnaphuli Irrigation	22.4	1980	Low-Lift Pump	37.0			
1976	Agriculture & Rural Development	12.0	1980	Import-VII	50.0			

Source: Ministry of Finance, **Flow of External Resources into Bangladesh** (as of June 30, 1982), External Resources Division, December 5, 1982, pp. 123-129.

SDR = Special Drawing Right. One SDR equals $1.32438 as of June 30, 1980.

Mangrove Afforestation ($11 million). This project allows planting of 100,000 acres of mangrove trees over five years with suitable strengthening of the supporting services, including research. It continues to expand the government's mangrove plantation program in the coastal districts of Chittagong, Noakhali, Patuakhali, and Barisal and to increase the production of fuelwood, pulpwood, and sawlogs.

Primary Education ($40 million). This project, involving forty thanas, constitutes a first phase towards the achievement of a national program for universal primary education. Improvement will be achieved by providing additional school facilities and materials, more female teachers, enhanced supervision to improve teacher performance and attendance, and greater community control of schools to overcome parental indifference. In addition, student/teacher ratios will be increased. The project will affect about 175,000 primary school children.

Fertilizer Industry Rehabilitation ($29 million). This project was designed to increase fertilizer production at three operating plants in Ghorasal, Chittagong, and Fenchuganj. It includes plant rehabilitation, staff training, and provision of spare parts, catalysts, and chemicals. Co-financing ($4.7 million) is being provided by the Netherlands Ministry of Development Cooperation (NMDC).

Import VII ($50 million). Foreign exchange has been provided for the import of industrial components, chemicals, raw matrials, and spare parts to enable selected priority industries such as textiles, paper and board, fertilizer, steel and foundry, chemicals and pharamaceuticals, sugar, cement, and some export-oriented firms to increase their production potential.

Jute Industries Rehabilitation ($20 million). The IDA credit is being used to rehabilitate and maintain machinery plus provide new machinery, establish and equip training centers, and improve organization and management.

Highway Project ($10 million). Bypasses are being constructed around the towns of Chandana and Comilla to relieve traffic congestion and reduce transport costs between Dhaka and Chittagong. Equipment and spare parts as well as consultant services to supervise construction will be provided.

Chittagong Water ($20 million). A water-intake and treatment plant, tubewells, and associated distributional works will be constructed and an iron removal plant and pumping station upgraded to help meet the added water needs for Chittagong through 1990.

Small-Scale Industry Project III ($26.7 million). The purpose of the project is to increase productivity, employment, and exports in the small and cottage industry sector by providing financial assistance and technical and marketing services to: (a) organized small industries and transport operations; (b) exporters and manufacturers of handicrafts and light industrial products; and (c) agro-related rural enterprises.

Bakhrabad Gas Development Project ($85 million). The project is being implemented over a three-year developmental period (1981-83) and includes drilling of four wells and the improvement of existing wells, provision of the necessary gas gathering and conditioning facilities, the construction of a twenty-four inch gas transmission pipeline from Bakhrabad to the city gate station in Chittagong, and other distributional lines to service the area.

Fertilizer Transport Project ($25 million). The project improves BADC's current fertilizer distribution system, improves transport handling and contracting procedures, and removes major physical bottlenecks in the fertilizer transport system.

Second Credit to Bangladesh Shilpa Bank ($50 million). The purpose of the credit is to finance lending by the Bangladesh Shilpa Bank for capital financing of small- and medium-scale enterprises in the private sector. The project will help to expand private investment in nontraditional export and import substitution industries and projects in less-developed areas of the country. This is the second IDA credit received by the Bangladesh Shilpa Bank. The first, amounting to U.S. $25 million, was approved in 1976.

Fourth Technical Assistance Project ($16 million). The IDA credit provides a source of foreign exchange with which to develop a pipeline of high priority projects responding to Bangladesh's developmental needs and suitable for potential financing by the Government of Bangladesh, IDA, and other donors. This is the fourth technical assistance project being financed by IDA in Bangladesh. As in the past, the projects developed under this credit emphasize agriculture and rural development and undertake preinvestment planning, feasibility and engineering studies, and training programs designed to strengthen Bangladesh's capacity for identifying and carrying out new projects.

Agricultural Credit Project ($32.6 million). The project aims to establish a replicable long-term credit delivery system and to increase agricultural production, income, and employment opportunities in five districts of the Rajshahi Division. The

main emphasis will be the provision of credit to farmer groups and individuals for the installation of shallow tubewells. The project also will finance other diversified lending for the construction of foodgrain storage facilities, the purchase of equipment and tools, equiping workshops for the maintenance of irrigation facilities, and a comprehensive local and short-term overseas training program for the staff of participating credit institutions.

Since 1971, IDA has allocated its assistance to Bangladesh in seven categories: (1) agriculture, irrigation, and rural development (22.5 percent); (2) industry (12.5 percent); (3) physical infrastructure and power (15 percent); (4) social sector (7.2 percent); (5) imports programs credit (36.1 percent); (6) technical assistance (2 percent); and (7) other (4.7 percent).[11]

Asian Development Bank (ADB)

Bangladesh is among the largest recipients of the twenty-two nations assisted by ADB.[12] From 1967-81, Bangladesh received loan authorizations for $810.9 million of which $676.6 million are effective. The amount of effective loans is the highest among all borrowing nations and represents 26 percent of ADB's total loans. Similarly, Bangladesh has received a disproportionately high share of technical assistance from the ADB. For the same period, Bangladesh accepted technical help in the amount of $15.7 million which accounted for 15 percent of the Bank's total. Bangladesh's technical assistance was second only to that received by Nepal (16 percent).

The loan activities of the ADB have involved forty-one projects in Bangladesh from 1973-81 (Table 7.3). Available information does not permit a detailed description of each of the prior projects, but the list of titles gives a flavor for the breadth of project support provided by the bank. However, for the six loan projects approved in 1981, a more detailed description follows:[13]

Community Schools ($13.5 million). This project provides skills training for the rural population through the establishment of small workshop facilities in about 220 secondary schools in selected thanas throughout the country.

Power System Rehabilitation and Expansion ($26.5 million). This project is aimed at: (1) reducing the gap between installed and available electrical capacities through the rehabilitation of certain power facilities; (2) catering to anticipated demand in the Rajshahi and Pabna areas through the construction of two new 132 KV transmission lines; and (3) upgrading the quality of power system operations. The project also includes training arrangements in cooperation with the power utilities of Thailand and consultant services for project implementation. The Canadian

TABLE 7.3
Loan Supported Projects by Asian Development Bank, Bangladesh, 1973-81 (million dollars)

Year	Project Description	Principal Amount	Year	Project Description	Principal Amount
1973	Fisheries Development	3.2	1978	Pabna Irrigation & Rural Devel.	38.0
1973	Shilpa Bank	6.0	1978	Low-Lift Pump Maintenance	8.9
1973	West Zone Power	9.3	1979	Food Grain Storage	9.0
1973	Chittagong Port	3.2	1979	Ashuganj Fertilizer Factory	25.0
1974	Shilpa Rin Sangstha	15.0	1979	Chittagong Hill Tracts Development	28.5
1974	West Zone Power (Supp)[a]	5.6	1979	Fisheries Credit	10.8
1974	Jute Seed	9.6	1979	Crop Intensification	11.8
1974	Railway	23.0	1979	Shilpa Rin Sangstha	30.0
1975	Ashuganj Fertilizer Factory	30.0	1980	Geological Survey	6.2
1975	Agricultural Credit	9.4	1980	Agricultural Credit	28.1
1975	Greater Dhaka Gas Distribution	12.2	1980	Rubber Industry Rehabilitation	20.0
1976	Chittagong Fertilizer Factor	2.5	1980	Tubewell Development	50.0
1976	Shilpa Rin Sangstha	25.0	1980	Public Health	15.6
1976	Integrated Rural Development	26.0	1980	Natural Gas Development	31.0
1977	Khulna-Mongla Road	15.0	1981	Community Schools	13.5
1977	Chittagong Power District	27.8	1981	Power System Rehab. & Expansion	26.5
1977	Agricultural Development	18.0	1981	Crop Intensification	18.0
1977	Meghna-Dhonagoda Irrigation	24.0	1981	Chittagong Fertilizer Factory	72.0
1978	Shilpa Bank	25.0	1981	Community Forestry Development	11.0
1978	Education Equipment Development	6.0	1981	Small-Scale Irrigation	50.0
1978	Livestock Services Devel. & Training	12.4	Total		811.1

Source: Asian Development Bank, "Statement of Loans," Mimeo printout prepared for Board of Directors--May 14, 1982. In possession of Program Office, USAID/Dhaka.

[a]Extends Industrial Loans International Commerce.

International Development Agency (CIDA) is cofinancing the project with $1.26 million.

Second Crop Intensification Program ($18 million). The program is designed to alleviate critical constraints on agricultural production in Tangail, Mymensingh, and Jamalpur districts in Northern Bangladesh through increased and more balanced fertilizer application, provision of improved seeds, construction of fertilizer storage facilities, and improvements to fertilizer marketing and training activities.

Chittagong Fertilizer Factory ($72 million). The construction of a urea fertilizer production facility is expected to produce 560,000 metric tons of urea annually using local gas supplies as both feedstock and fuel. The project is given added financing by the Abu Dhabi Fund for Arab Economic Development ($25 million), Canadian International Development Agency ($20 million), International Development Association ($15 million), Islamic Development Bank ($16 million), Oversea Economic Cooperation Fund of Japan ($60 million), and Saudi Fund for Development ($85 million).

Community Forestry ($11 million). This is the bank's first project designed to increase fuelwood supplies through plantation activities involving community participation. Under the project, available land such as village homesteads and stripland along roads, railway lines, and canals which have not hitherto been used systematically for fuelwood production, as well as depleted government forestlands, will be planted to fastgrowing species. UNDP is cofinancing the project with $1.84 million (see "Technical assistance projects" which follows).

Small-Scale Irrigation Sector ($50 million). The project provides for construction and/or rehabilitation of irrigation, drainage, and flood protection facilities, and the installation of irrigation equipment in about thirty subprojects nationwide. It also provides surveys, laboratory office equipment, vehicles, facilities for project monitoring, overseas training for staff, and consultant services. The European Economic Community (EEC) is cofinancing the project with $12 million.

Technical assistance projects to Bangladesh approved for ADB participation in 1981 were the following:

Bhola Irrigation ($219,300). To help the government formulate an irrigation and area developmental project and prepare a comprehensive project feasibility study in an area which offers considerable potential for irrigation development. FAO is co-financing the technical assistance with $130,000.

Second Tubewell ($400,000). To help the government formulate a tubewell project in the Districts of Tangail and Jamalpur and the northern part of Mymensingh District. To be financed by UNDP with the ADB acting as executing agent.

Community Forestry ($1.84 million). To provide consultant services and fellowships for the implementation of the bank-assisted project. To be financed by UNDP with the ADB acting as the executing agent.

Community Forestry Institution Building ($250,000). To finance the cost of fielding a specialist in community forestry institutions who will assist in institutional building.

Feeder Roads Improvement ($310,000). For consultant services to assist the BDG in preparing a suitable rural roads improvement project in the three Northern districts of Mymensingh, Jamalpur and Tangail. To be financed by the Government of Switzerland and administered by ADB.

Bilateral Assistance

United States (USAID)

U.S. bilateral assistance to Bangladesh dates back to 1953 and the period immediately following partition from Britain when the nation was the Eastern part of Pakistan. Support from 1953-71 totaled an estimated $645 million and encompassed a broad range of developmental type projects.[14] Included among the activities were the Karnaphuli hydroelectric project, coastal embankment projects, and support to agricultural and engineering universities. Additionally, significant amounts of foodgrains, vegetable oils, and fertilizer were imported as commodity assistance. Selected health and family planning projects covered both the East and West sectors of the country. In total, the estimated project assistance by major categories from 1953-71 was:[15]

1.	Agriculture and natural resources	------	$355.0 (million)
2.	Health and sanitation	------	40.5 "
3.	Education	------	55.1 "
4.	Industry	------	0.4 "
5.	Roads, railways, waterways and ports	------	59.0 "
6.	Power sector	------	86.6 "
7.	Miscellaneous support	------	24.8 "
8.	Relief and rehabilitation	------	23.1
	TOTAL		$644.5 (million)

Assistance during the period immediately following independence was primarily food relief to meet the hardships of famine arising from the war and, to some extent, the aftermath of the devastating cyclone which struck Bangladesh in late 1970. Commodity aid was initiated during this period for famine relief and has continued as an integral part of the U.S. assistance program to help meet the food security requirements of the BDG, but at a reduced volume. The programming of project assistance during these earlier years was not as well articulated as in succeeding periods and, generally, represented a response to immediate needs. For that reason, infrastructure development and rehabilitation were early focuses. In the mid to late 1970s population control and agricultural production projects began to emerge as emphasis was given to fertilizer availability and storage construction, and to agricultural research. The evolution of program planning from rehabilitation to a developmental orientation occurred in the late 1970s and now emphasizes population and agriculture. Employment and energy have been identified as other priority sectors and operational projects are now being formulated. Project funding is provided from two general sources, Food Aid (Public Law 480) and Development Assistance.

Public Law 480 assistance involves U.S. produced agricultural products which are disbursed under three separate programs. Title I activities encompass concessional sales of these products under highly favorable loan terms. Currently, loans under Title I are made at 2 percent interest during the ten years grace and 3 percent for twenty years of repayment. Loan repayment must be made in dollars. Title II aid is provided entirely on a grant basis, with the U.S. government assuming the cost of both the commodity and the ocean transport. Since 1975, all Title II foodgrains have been used in Food for Work (FFW) programs. Title III programs have the same initial conditions as Title I but provide for subsequent change. If the BDG agrees to significant policy reforms as outlined in the Title III agreement, the loan obligations are forgiven with the additional provision that funds associated with the loan release are to be spent as local currency on developmental projects jointly agreed upon by USAID and the BDG.

Public Law 480 programs in Bangladesh began in 1971. The first phase (1971-74) emphasized provision of wheat, mainly for emergency relief, and was in the mode of the Title I agreement. The second phase (1975-78) correlates with the advent of the Title II agreements which moved the program focus from wheat for relief to wheat for work and the creation of public earthen works as a product of the assistance given to the unemployed. The final period (1978-present) has seen a continuation of the Food for Work focus, but with the initiation of Title III, the overall emphasis of P.L. 480 programming has shifted to agricultural development and the use of commodities to both fill national

needs for such items as foodgrains and edible oils and to encourage revisions in public policy.

From 1972-82, P.L. 480 disbursements have totalled $1,055.0 million (Table 7.4). Title I has accounted for 49 percent of the total, but Title 1 disbursements in recent years have been minimal. Wheat has been, by far, the most commonly disbursed commodity.

Title I. The USAID program under Title I has been essentially a food assistance import program but on the concessional commercial terms indicated above. Most of the program activity occurred prior to 1977 when large amounts of wheat were imported to help offset the foodgrain supply shortfalls, particularly in the early years after independence. With the advent of Title II and III options for Bangladesh, Title I programming has diminished to the point that no active programs are currently in operation. The last agreement under Title I was for importing limited amounts of cotton in 1980.

Title II--Food for Work. The food grants under Title II represent 27 percent of the total P.L. 480 commodity disbursements to Bangladesh. Prior to 1975, these supplies were generally distributed by sale through the public rationing system, with only limited numbers of work projects designed to reach the poorest sector of the populace. However, in 1975 an agreement was reached between USAID and the BDG to utilize Title II wheat as a wage vehicle for the rural poor to engage in earthwork projects.[16] The program is currently projected through 1985.

The FFW program in Bangladesh includes grant assistance to the Cooperative for American Relief Everywhere (CARE) which serves as the implementation and monitoring agent for USAID. About one-half of the in-country costs for CARE personnel and equipment are paid by USAID, which also underwrites the costs of Title II commodities and ocean freight. The BDG provides the other portion of CARE's costs through local currency support. As of 1981, the cumulative support of CARE's in-country costs by USAID has totaled about $2.8 million.

Food for Work encompasses a nationwide program of earthwork projects, concentrating on the construction and upgrading of roads and embankments, the excavation and repair of canals, and the construction of tanks (ponds) for water storage and/or fish breeding. All twenty-two districts have some form of FFW activity. The projects are designed both to provide relief and employment to the needy and to assist the development efforts of the nation. They do this by translating donor wheat and excess local labor into rural infrastructure. The USAID/CARE effort is part of a larger BDG work program. USAID has supported about 30 percent of the national program when measured in terms of tonnage

TABLE 7.4
Public Law 480 Disbursements from 1972-82, Bangladesh

	Total Value	Commodities				
		Wheat	Rice	Edible Oils	Other	Cotton
	($ mil.)	-----(1000 metric tons)------				(1000 bales)
Title I	517.1	1517	646	108	--	49
Title II	282.2	1594	154	87	109	--
Title III	255.7	1346	55	25	--	27
Total	**1055.0**	**4457**	**855**	**220**	**109**	**76**

Source: USAID, **U.S. Bilateral Economic Assistance to Bangladesh--All Years Summary**, Program Office, October 1982.

of wheat paid as wages in the development of rural infrastructure.[17]

Since the inception of the current USAID program, 6,766 FFW projects have been initiated as of the end of 1982. Canal projects were most common (35 percent), followed by roads (28 percent), and by embankment repairs (18 percent). During any one season, about 1,000 projects are under implementation.[18] In addition, 2,591 projects provided rainy season employment in 1977, but the program was not continued.

Participants in the FFW projects are paid in wheat, with payment based on the amount of earth moved each day. Currently, such payments average about 5.5 seers per day (1 seer equals 2.1 pounds). One estimate is that between 2.7 and 4.7 million people are unemployed during the dry season and could potentially benefit from FFW activities.[19] The projects do not involve this number of people, but evaluations indicate that the targeted poor segment of the population is being assisted by FFW activities. For example, a 1976 evaluation found that 67 percent of the FFW families had no farmland or homestead land, and that the average farm size among FFW participants who owned land was 0.38 acres per family.[20]

There is little doubt that the FFW program is beneficial and that it represents one of the approaches which can directly impact on the poorest sector without being vulnerable to criticism that the rich are benefiting above the target group. Its impact in Bangladesh has been significant, especially in meeting the critical welfare need of the landless and other

disadvantaged groups. Without a FFW program or its eqivalent, considerable suffering, possibly starvation, would likely have surfaced during these years. Also on an annual basis, the projects have benefitted the country by upgrading about 3,500 miles of rural roads and 1,000 miles of canals. The secondary benefits from FFW include improvement of farm-to-market roads plus expanded irrigation acreage.

The program has suffered from administrative difficulties which have reduced its impact and which demand continual attention. The principal deficiency is the misuse and diversion of project commodities brought by ineffective BDG program management. An audit report has estimated discrepancies as high as 20 percent between the amount of wheat reportedly disbursed to FFW workers and the quantity which should have been paid to them, based on the postproject measurements of earth actually moved.[21] Corrective measures are part of efforts by USAID and CARE of a program mode in which the opportunity for misuse and corruption are virtually built in, given the large volume of commodity handled, the decentralized localities where work occurs, and other factors inhibiting close administrative control. Nonetheless, the FFW program has directly responded to a critical relief need in Bangladesh and adds a developmental dimension via the conversion of food aid into badly needed rural infrastructure.

Title III. The programs supported by Title III address the essential issues of increasing agricultural production to meet self-sufficiency as set forth in the BDG medium-term foodgrain production program. The programs focuses on revisions in public policies (particularly foodgrain management) and encourages greater private sector activity as a stimulus to economic growth.

The first Title III agreement was signed in 1978 and was extended with a second agreement in March 1982 which is programmed through 1985. The present program has eight separate components: (1) to maintain incentive prices to farmers to accelerate agricultural production; (2) to implement an open market sales option with paddy rice and wheat to moderate price increases; (3) to hold foodgrain reserves; (4) to phase out all elements of the public food distribution system by the time foodgrain self-sufficiency is achieved; (5) to establish proper management of foodgrain stocks to avert spoilage; (6) to develop a private cotton textile spinning industry; (7) to establish a private sector capability to wholesale and retail vegetable oils; and (8) to utilize Title III proceeds for jointly agreed upon developmental projects.

Enactment of the Title III program in 1978 in Bangladesh was among the first such programs attempted worldwide by USAID, and the effort has evolved as experience has tested the concept. It was particularly unique in its approach to having an impact on

national policy formulation. A recent external evaluation of the Title III program gave high marks for its impact on improving food policy planning, reducing subsidies associated with the foodgrain distributional system, facilitating more efficient operation of foodgrain marketing via the "open market sales" option, and promoting private sector participation in the marketing of foodgrains and the production of textiles. The policy reforms linked to Title III also were seen as important forces in the rise of agricultural production in recent years.[22]

With these initial successes, the Title III program has set the cornerstone for a continuing dialogue with the BDG on public policy issues which will have far-reaching effects on the agricultural development program.

Apart from the food programs, the U.S. provides a high level of aid to Bangladesh through its developmental assistance projects. These activities are oriented toward technical solutions to the developmental issues facing the nation. Following the initial program emphasis on reconstruction and relief needs occasioned by the dislocation and upheaval associated with the 1971 conflict, U.S. development assistance has moved more toward technical project aid and, except for a period in the mid-1970s which stressed large-scale fertilizer imports and rural electrification, support has settled into a distinctive developmental mode.[23]

Since 1971, funding for development assistance has totaled $897.9 million, which, in consort with the food aid, brings the total U.S. assistance to $1.95 billion. For the period 1953-82 the total food and developmental assistance has been $2.59 billion. Developmental assistance is currently categorized into four major program areas.

Population/Health ($86.5 million). Family planning activities were among the early postindependence projects supported by U.S. development assistance. Programming initially began in 1973. Efforts became more earnest in the mid-1970s as part of a BDG response to donor urging which resulted in the establishment of a National Population Council, chaired by the President of Bangladesh. A comprehensive national population plan was prepared in recognition of the need to alter existing demographic trends and behavior. The plan identified education, information, and motivation as essential ingredients, and the concept of providing nationwide family planning services was adopted.

Considerable progress has been made towards establishing a national program structure. ADP funding by the BDG for population planning rose from Tk. 77 million in 1975 to Tk. 696 million in 1981 and is budgeted at Tk. 944 million in 1982 (Table 6.2). This trend reflects extensive donor assistance. The delivery system infrastructure for a substantial program in both planning assistance and clinical services has been put in place.

USAID support of the family planning effort was extended in 1981 with the commitment of about $59.8 million to BDG programs for the ensuing three years. The current support is for a program strategy directed at raising the rate of use of a wide range of birth control measures among eligible couples. The targeted increase in contraceptive use is from the preproject level of 13 percent to 25 percent by 1984.[24] Hardly any of the USAID assistance since 1973 has been used for establishing program infrastructure. These phases have been provided by other donors, such as (UNFPA) who, with the United States, have been the major contributors to the BDG family planning effort.

The current USAID program strategy has two major focuses. First, the availability of contraceptive devices and services is being increased by augmenting their supply, improving the distribution system, and giving support to local costs of a voluntary sterilization program.

The second major emphasis is the use of Non-Government Organizations (NGO) in a range of family planning related activities. Bilateral contracts are presently in force with nine NGOs. The largest is with Population Services International (PSI) which is charged with implementing the Social Marketing Project under which contraceptive distribution will be improved and expanded through 70,000 outlets in the private sector.

Among other significant health-related activities, USAID has previously assisted the ICDDRB (1973-80, $12.7 million). The funding aided research on cholera prevention and treatment. The same support also made possible two long-term studies on the demographic impact of family planning programs.

Agriculture ($415.9 million). Agricultural programming since independence has been heavily oriented towards fertilizer issues, due mostly to the dominant weight given these activities in the mid-1970s. Substantial amounts of fertilizer were imported in 1974 and 1975. Smaller but continued imports have occurred from 1978-81. In addition, funding was provided to assist construction of the Zia fertilizer plant in Ashuganj. The plant is expected to be totally operational in 1983. Also, support has been extended for construction of fertilizer storage and technical assistance to improve the fertilizer marketing system. In a fairly direct way, the total fertilizer program has been supportive of subsequent policy reforms which are moving the marketing system more and more away from subsidized BDG control and more towards private sector management. (The nature and extent of these changes were discussed in Chapter 4.)

USAID support of agricultural research began in 1976 and is now programmed through 1986. Major portions of the assistance are channeled through the Bangladesh Agricultural Research Council (BARC) and the Bangladesh Rice Research Institute (BRRI). The assistance calls for expatriate scientists to collaborate in-country with those from the local institutes. Research

activities are broad-based but emphasize crop varietal development, irrigation practices and water institutions, pest and rodent control, and development of appropriate management practices. Support of the BRRI rice research effort is a multidonor effort.

Irrigation and credit are also component parts of a strategy to test pilot projects that will improve agricultural input availability. A small-scale irrigation project, begun in 1976 with funding through 1982, has provided a $14.5 million loan to finance hand pump sales to small farmers. A proposed water management systems project will deal with ways to improve the efficiency of water use and the size of command areas for tubewells. If implemented, this project will constitute the first major irrigation project of USAID. The Rural Finance Experimental project, which ended in 1982, tested eight credit models which incorporate more realistic lending rates and credit loan procedures. The test study was carried out with nine Bangladesh credit institutions. A follow-on project is planned for 1983 which incorporates the findings of the pilot project as the basis for major policy and administrative reforms in the agricultural credit system.

USAID has supported two infrastructural type, agricultural-related projects. The Zilla Roads Maintenance project will improve maintenance of rural market access roads. The project began in 1981 and will terminate its first phase in 1984. Disbursements for rural electrification, which began in 1977, are currently scheduled to continue through 1987.

An Agro-Climatic Environmental Monitoring Project, started in 1980, is designed to upgrade the BDG capability to obtain and analyze a wide variety of agroclimatic data related to agriculture, meteorology, forestry, fisheries, and the overall ecosystems as the basis for monitoring foodgrain production in Bangladesh.

Rural Industries/Employment ($2.5 million). USAID ventures into employment issues are of recent origin (1981) and are still mainly in the planning stages. The current design provides assistance to the Micro Industries Development Assistance Society (MIDAS), a private indigenous organization, which gives technical and managerial assistance and product promotional information to small-scale enterprises. A fund is also available for governmental and private sector firms for financing feasibility studies and pilot projects for small-scale product and industry development. Additional programs to support rural industrial development are anticipated. Also, the Title II Food for Work program, has direct impact on some of the most critical rural employment issues in Bangladesh.

Energy ($99.9 million). USAID's overall energy program is evolving. An energy sector assessment is planned for 1983. The

mission has supported the Karnaphuli Hydro-Electric project in the Chittagong Hill Tracts since before independence. The third unit of the project received mission funding in 1976 (with a small supplement in 1980) and was completed in 1982. The aforementioned rural electrification project is also energy-related.

Other U.S. Assistance ($293.1 million). Since 1973, USAID has provided a wide range of disaster relief and rehabilitation assistance mostly during the postwar recovery period. Also, aid has been given to numerous NGOs to implement rural development and health and family planning projects closely allied to USAID developmental assistance. Finally, a variety of miscellaneous activities has been supported, including personnel training, project development, administration of CARE, the National Women's Development Academy, and a flood and cyclone warning system.

Japan (JICA)

Japan is second to the United States in the amount of bilateral assistance given to Bangladesh (Table 7.1). The foreign assistance program is administered by the Japan International Cooperative Agency (JICA). Total assistance to Bangladesh has amounted to slightly more than $1 billion since 1971. About 75 percent of Japan's assistance has been in concessionary loans and the remainder in grants.[25]

The Japanese program is not highly structured or focused except for the heavy commitment to food aid and commodity assistance. The flexible programming is indicative of the Japanese policy to provide assistance in any needed area, except military. Of the total loan funds made available since 1971, about 73 percent has been for commodities. Food aid represented 28 percent of the grant assistance, which was the largest single grant item.

Both the grant and loan assistance shows considerable diffusion in the kind of projects supported by JICA. Among the agricultural-related projects, fertilizer imports, deep tubewell equipment, foodgrain storage, and textile goods and equipment were most important. Research and extension have received nominal support, mostly in the form of research equipment at BARI and for fisheries investigations plus some assistance in establishing an extension institute. Grants have been made for nonagricultural items such as broadcasting facilities, medical equipment, and the purchase of an airplane. The modern Sonargaon Hotel in Dhaka is also a product of JICA aid. Debt relief grants from Japanese loans have amounted to 10 percent of the total.

Among the noncommodity loan support, energy related development has amounted to 12 percent of the Japanese assistance. The more sizeable projects have included: (1) electrical transmission lines from Bhernmard-Faridpur-Barisal in

1980, and from Goalpara-Barisal in 1976; (2) the Bakhrabad gas developmental project; and (3) a power-generating barge at Khulna. Additionally, assistance was given in 1980 for the rehabilitation and expansion of the Karnaphuli rayon manufacturing plants and in 1981 to the fertilizer factory construction at Ashuganj.

Generally speaking, assistance from Japan has been for capital transfers as opposed to technological transfers. The heavy dominance of commodity grants and loans plus the concentration on infrastructure, equipment purchases, and other construction are indicative of capital transfers. Still, JICA programs contain a fair amount of training activity, much of which is carried out under programs established in Japan to meet the special needs of LDC personnel.

Other Selected Donor Programs

Among the extensive list of other donors, the Federal Republic of Germany (FRG), Canada, and the United Kingdom (UK) provide significant assistance to Bangladesh. All three nations had developmental programs in the region during the Pakistan period and the assistance continued in the East after independence. Furthermore, all of the assistance tendered to Bangladesh since 1971 by these three nations has been in the form of grants, and all prior loans have been converted to grants.

Federal Republic of Germany. Activities by the FRG have been widespread beginning with assistance to the livestock sector in 1972 to improve the national herd through improved breeding stock and managerial techniques.[26] Much of the artificial insemination development in Bangladesh has been FRG-assisted. Germany provided extensive food assistance (primarily wheat) during the cyclone and flooding of the early 1970s which led to subsequent activities in promoting deep tubewell drillings and a related agricultural project at Cox's Bazaar. Later, the FRG assisted in the financing of the Ashuganj (Zia) Fertilizer Factory and the rehabilitation of electrical power stations in the western grid which serve areas involved in earlier FRG deep tubewell projects. Since 1975, major support has been given to BADC to augment its capacity in seed production. Seed processing centers have been developed, technical assistance in field multiplication techniques provided, and, in a few instances, foundation seed has been imported. Newly tendered support is being given to develop plant protection capability of the MOA directorate.

Despite its historical support of agricultural projects, the sector programs have been secondary to project assistance in infrastructure. More recent commitments have been made to gas exploration and power (energy) development. FRG assistance is composed mostly of financial and commodity aid. Food assistance has been very minimal. Commodity aid has been composed mostly of

fertilizer, agricultural implements, and other machinery related to their support of seed and irrigation projects.

Canada. Canadian assistance, through its international arm CIDA, has been heavily oriented towards food assistance.[27] Traditionally, about 50 percent of the total aid has been in food, which makes Canada the second largest food donor in Bangladesh. CIDA has focused more support on agriculture during the last three years. Small-scale water control structures to complement food for work projects, foodgrain storage construction, and fertilizer commodity imports have been important components. Since 1977, CIDA has supported research work at both the Bangladesh Rice Research Institute (BRRI) and the Bangladesh Agricultural Research Institute (BARI) to develop new rice and wheat varietes. Support for physical plant construction also was given. CIDA has collaborated extensively with the World Bank Muhuri Irrigation Project in Chittagong. A new project will provide technical assistance to the agricultural planning effort of Bangladesh.

Aside from agriculture, CIDA has given sizeable help to infrastructural development. One project has assisted the rehabilitation of the railways by providing new locomotives, overhauling existing units, and improving maintenance and inventory control systems. Installation of new railway track (160 miles) is programmed for the next three years. Short-and long-span bridge rehabilitations are also in various stages of programming and implementation. Power and energy improvements have been and are a part of CIDA's programs, including installation of transmission line and substation rehabilitation, much of it in collaboration with ADB. CIDA is also assisting the World Bank population project with direct support to the statistical collection units. Additionally, Bangladeshi NGOs which have village level projects in training and organization, are being assisted.

United Kingdom. Assistance by the U.K. has its roots in the Pakistan era, more so than for other donors, and is heavily oriented towards commodity assistance (about 40 percent). Food assistance is minimal.[28] Still, technical project assistance has been extensive in agricultural and infrastructural development. Between 1977-82, U.K. technicians have collaborated with BRRI to develop management schemes to improve yields of deep water rice. Additionally, continuing support has been given to improving the tea estates with a broad ranging program which included factory modernization, agronomic studies, personnel training, and estate improvements. More recent aid has been dispensed to rehabilitate foodgrain storage facilities, advise in cereal seed multiplication, development of livestock tissue culture vaccines, and the rehabilitation of unused fish culture tanks and ponds in Pabna, plus allied housing, laboratories, and buildings. A 1978

project with BRRI to reduce postharvest losses has produced new designs for rice mill dryers. Present assistance to the sugar industry includes turbo alternators for the North Bengal Sugar Mill and deep tubewell development (including pumps and engines) in Northwest Bengal. New cotton spinning plants at the Alarsha Mill near Dhaka and the Mohini Mill near Kushtia are nearing completion.

Energy, power, and transport also have been extensively supported by the U.K. Among the energy and power projects are: (1) water treatment and ancillary equipment to provide acceptable water for power stations at Khulna and Goalpara; (2) partial financing of a 90 MW combined cycle power station at Ashuganj; and (3) the completed drilling of a fifth well in the Titas natural gas field to supply the Zia Fertilizer Factory. A major support effort is now being given to the Greater Dhaka Power project to expand transmission and distribution within the area. Railroads have been assisted with new wagons plus rehabilitation of tracks and railway workshops. New designs for country boats and bullock carts being developed by British scientists are intended to improve the rural transport system in Bangladesh.

Others. The breadth and diversity of project support described for these largest bilateral donors is fairly typical of the assistance from the total donor community. Those offering lesser amounts of assistance identify smaller projects or multiply their contributions via collaborative efforts with IDA or ADB. For example, Sweden has supported the development of the Institute for Nuclear Agriculture (INA) as well as technical assistance on oilseed breeding.[29] Denmark has shown some tendency towards a training focus with its support of the Institute for Livestock Food Technology and development of an experiment station for agriculture at Mymensingh.[30] Many donors participate in some way in the population control programs for Bangaldesh.

Private Volunteer Organizations (PVOs)

The community of PVOs in Bangaldesh is extensive and includes all classes of voluntary organizations, both external as well as domestic. The exact number is not known, but those who fill the traditional role of the private volunteer are likely in excess of one-hundred.[31] The Technical Assistance Information Clearing House lists forty-four nonprofit U.S. associations in Bangladesh in September 1981. By whatever count, Bangladesh is a fertile ground for voluntary organizations and likely has one of the largest representations, if not the largest, found anywhere in the world.

The objectives of volunteer organizations generally fall into three categories: relief, development, and missionary. Traditionally, volunteer groups have focused their programs on

agriculture, health, family planning, and community development. This orientation is of comparatively recent origin since many of the organizations now in Bangladesh first provided disaster relief assistance in the early 1970s. The experience and rapport they gained encouraged many to stay but necessitated a reorientation in programming from relief to development. The conversion has not been entirely successful, but more and more of the groups are providing quality assistance. An assessment by USAID of several projects involving nongovernmental organizations (NGOs) concluded that these groups can: (1) provide good health and family planning services; (2) conduct good agricultural extension work; (3) organize useful training programs; and (4) test and develop improved technologies although the risk is high.[32]

The overall involvement and success of the volunteer organizations in Bangladesh is difficult to ascertain. Their activities carry them into diverse types of assistance which are not easily summarized. However, there is little doubt that the impact of the better ones is being felt. The most noteworthy weaknesses of the volunteer groups collectively are their inadequate program management and their evaluation system. Their inability to properly design and monitor projects is fairly widespread. However, of equal concern is their failure to set targets and time frames for project outcomes which should lead to a disassociation so that the local domestic groups can assume project control at some time. The tendency is for PVO projects to continue well beyond reasonable targeted dates. Also, PVO projects are seldom evaluated by peer groups as are most other donor programs. Limited funding may contribute to this shortcoming.

Problems of Donor Assistance

The assistance supplied by the donor community has been of prime value to developmental progress occurring in Bangladesh since independence. Without it, the nation would have faced enormous difficulties which may well have resulted in widespread starvation. Yet, despite the admirable past effort, the present system has inadequacies which should be addressed in the interest of greater overall effectiveness. Many of these inadequacies involve intangibles which are difficult to quantify and to generalize for the total system. In fact, many of the issues are easier to point to than to articulate or define in precise terms. They are essentially deviations from a desired norm of performance for the donor system which make sense in order to achieve more effective application of the resources. In all

cases, the issues are interrelated and cannot be viewed as mutually exclusive.

Donor Coordination

The coordination of donor programs in Bangladesh by comparison with many LDCs ranks high. Dialogue between the BDG and most donors is open and a number of institutional arrangements have evolved which promote communication. At the highest levels, an Aid Consortium Group meeting is held annually with the participation of mission directors, donor home country officials, and high-ranking BDG ministry leadership. The performance of the economy, BDG plans and budget projections, and donor concerns and apparent levels of support for the upcoming year are discussed and debated with the BDG. The forum establishes general guidelines for both donors and the BDG. Additionally, a local consulative group is convened regularly throughout the year to discuss issues and inform the community of new directions and programs under consideration by the BDG or particular donors. Likewise, review sessions and reoccurring negotiations between the BDG and individual donors offer added opportunities to identify program interests and needs.

Most donors provide inputs to the system and participate in the formal process. Furthermore, most recognize the need for coordination. Yet, despite this avowed conversion to and support of an elaborate system of coordination, most donors prefer independence. As a result, most have some level of programming (projects) in most major sectors and subsectors. The scenario often results from donor initiatives to find projects which fit their individual developmental philosophy, their perspective of programmatic constraints, or the availability of excess commodities or food rather than BDG initiatives to organize and focus multidonor support. The offering of "gift horses" is not an uncommon occurrence nor are donor program aspirations which are promoted from their own sense of need. The problem is exacerbated by the failure of many donors to articulate their programmatic interests and make requisite long-term commitments for support.

BDG Fiscal Capability

Overall budget deficits have faced the BDG each year since independence which has created an excessive reliance on donor support for a high proportion of the ADP funding. Additionally, portions of food aid and commodity assistance are translated into support for annual budgetary needs in a financial system which has become extremely intricate and vulnerable. The margin for adjustment is so precarious that fluctuations in any of several financial indicators results in major problems with what otherwise might be a routine adjustment for the system.

In recent years, donor aid has shifted emphasis more and more to project assistance, which generally increases the requirement for domestic resources and local currency in order for the BDG to release the donor funding. This change seems to ignore the current fiscal realities of the BDG which reflects their past failure to effectively deal with the issues of domestic resource mobilization. The present restrictions in domestic capacity have become so great that a maximum of only about 22 percent of the project funds available in the pipeline at year's beginning are being utilized annually due to the limited release of taka support. Still, the drive for new projects continues. In the 1982 ADP, for example, there were 1,726 projects making claim to the limited BDG taka availability.[33] The scope and magnitude of programming literally overwhelms the fiscal limitations of the BDG. Initiation of the core program in 1983 offers potential for a more orderly process. Priority projects identified for inclusion in the core program are to be protected from many of the vagaries of the financial system. Taka requirements and orderly fund releases are to be assured for these priority projects beginning in 1983. The process should also mean that future shortfalls of BDG funds will not be applied to projects across-the-board, and, at least, implementation of the priority projects can proceed without interruption.

Past delays in project implementation have been costly, not only in foregone benefits from project development but also in project investment which escalates significantly from inflation. Furthermore, the dangers of wasteful investment and the rule of expediency rise when all donor commitments cannot be accommodated. This problem seems likely to persist, at least in part, even with the possible relief by the core project concept. Donors can now shift their attention to the core program and the means of obtaining approval for their projects under this umbrella.

BDG Public Institutions

The recent reorganization of public entities serving agriculture shows indications of potential improvement in their capacity to meet the requirements of public administration. Still, the units of government appear to lack sufficient maturity in terms of administrative staff, management capability, and technical resources to deal adequately with the ever-growing complexity of the donor community. The problems are magnified somewhat by the tendency towards functional duplications and overlapping jurisdictions, plus operational independence of divisions within the ministerial structure. For example, research-related activities are performed by BRRI, BARI, SRI, BAU, INA, BWDB, and the Jute Division of the MOA, to name just a few, without the benefit of strong integrating coordination. While BARC is making progress in filling this coordination role,

all of these research agencies also have extension responsibilities in addition to those given to the Directorate of Agricultural Extension and Management. Part of these duplications arise from the orientation towards vertical integration associated with the strong crop orientation. But the total effect is to create public institutions which have difficulty confronting the project and administrative demands of development.

The inadequacy of the existing agencies and structure is exacerbated when so much of the confusion and pressures caused by the hetrogeneity of donors' views and philosophy are brought to the BDG institutions, both in planning and project implementation. The resultant load is just too great for the capacity of the BDG system to manage efficiently. The BDG struggles daily to manage the diverse programs of the donor community, perhaps even at the expense of adequately defining the nature of the public need to be served by each.

Personnel and Data Base

Bangaldesh has a larger number of trained personnel to staff developmental planning and project implementation assignments than normally found in LDCs. Yet, insufficiencies in qualified personnel still exist, and the critical mass of human capability needed to make sustained progress is not yet in place. The low salaries, the lack of professional incentives, and the cumbersome and ineffective administrative system which operates within the bureaucracy all contribute to the reduced productivity of many within the public sector who interface with donor programs.

The data base is likewise more extensive than that generally found in developing nations. Bangladesh has been studied widely, and some data series are intact. Still, the total data set is not adequate to fill the needs of the country. The statistical collection system does not systematically generate a continuing time-series of the most basic types of data. As examples: analyses which require income and expenditure distributions must still rely on household expenditure data from a 1974 survey; adequate estimates of price and income elasticities for important crops have not been made; market structure and flow information are not current; data for inputs as basic as national employment and wages are totally inadequate; farm level prices are not collected; base weather and related data for crop forecasting are deficient; and population estimates are of uncertain accuracy, albeit, improved from the 1974 census. Aside from data types, the quality and timeliness of data are also issues. Even existing series such as for imports and exports are delayed six months or more before final verification and publication.

Both the personnel and data base limitations have prevented a complete definition of clear-cut national priorities and strategies. Sectoral investment programs are not available for

all sectors to guide decisions nor do periodic reviews of existing programs occur often enough. Policy analysis of impacts and options of BDG interventions is also lacking.

The total donor assistance picture adds up to one of huge amounts of assistance being imposed on a structure which is likely better than that found in most LDCs, but one that is still in need of betterment. The deficiencies are apparent but, at the same time, somewhat intangible. The system of both planing and utilizing donor assistance does work in Bangladesh. However, it could function much more effectively if the basic problems discussed above could be alleviated.

Summary

Bangladesh is one of the most heavily assisted nations among the world's developing countries. About thirty-five nations, ten multilateral agencies, and a limited number of private institutions have provided loan and grant assistance to Bangladesh since independence. The nations tendering aid to Bangladesh come from the Eastern block, OPEC and the West. Foreign donors have committed $12.7 billion since 1972 of which 44 percent were grants and $9.0 billion have been disbursed as of June 1982. The annual average disbursement has been about $857 million for the past ten and one-half years. Approximately 68 percent of the disbursals have been in food and commodity aid.

The principal multilateral donors are IDA and ADB. Both make "soft" loans. These two agencies have contributed 35 percent of the total donor assistance received by Bangladesh. Among the bilateral donors, the United States is the most important with 13 percent of all donor assistance since 1971, followed closely by Japan. Other major bilatreal donors are the Federal Republic of Germany, Canada, and the United Kingdom. The large amounts of support translate into a significant volume of projects and other activities. The BDG officially lists 321 donor-supported loan projects through June 1982. No estimate of grant projects is available, but the number is considerably greater than those which are loan-funded. The scope of projects is extremely varied and includes all aspects of agriculture, transportation, power, energy, education and training, industry, and related areas. Population planning and health are also major areas of concentration. Agriculture, rural development, and water and flood control activities have received 17 percent of the total project aid. Lack of data precludes estimates of the proporation of food and commodity aid allocated to the agricultural sector.

The U.S. assistance program was initiated in 1953. From then through 1971, $645 million was extended. Since 1971, $865.5 million has been provided as developmental assistance and $1,033.5 million under P.L. 480. Food for Work has accounted for

35 percent of the P.L. 480 disbursements. Under FFW, 6,766 earthwork projects and 2,591 special rainy season projects have provided extensive employment for the poorest segments of Bangldesh's rural population. In the process, about 3,500 miles of rural roads and 1,000 miles of canals have been constructed or upgraded each year.

Currently, the U.S. developmental assistance program focuses on four major areas: (1) population and health; (2) agriculture; (3) employment; and (4) energy. Among the other areas, the population program is a major effort which has continued since 1973. The target is to increase contraceptive use among eligible couples from a preproject level of 13 percent to a target of 25 percent.

In general, the system of donor assistance in Bangladesh works better than in many LDCs. But four constraints still reduce its effectiveness: (1) inadequate donor coordination; (2) limited BDG fiscal capability; (3) lack of capacity of BDG institutions; and (4) limitations in the data base and personnel.

Footnotes

[1]The information for this discussion is taken from: Ministry ofFinance and Planning, Flow of External Resources into Bangladesh, Division of External Resources, December 5, 1982.

[2]The average annual budget deficit calculated in Table 6.5 was $600 million.

[3]Ministry of Finance, External Resources, p. 15.

[4]Ibid p. 141.

[5]These are nations from the Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD). They are from the so-called "Western World."

[6]For those interested in the complete list of donor loan projects see: Ministry of Finance, External Resources, Table 15.

[7]IDA is legally and financially distinct from the World Bank but administered by the same staff. IDA refers to credits to distinguish their funds from the Bank's loans.

[8]World Bank, Annual Report 1980, June 30, 1980, p. 170.

[9]Ministry of Finance, External Resources, pp. 123-129.

[10]The project descriptions come from two mimeographed summaries of the World Bank/Dhaka entitled, "IDA Lending to BangladeshDuring FY 79, and FY 80," which are in the possession of the Program Office USAID/Dhaka.

[11]World Bank, IDA Lending to Bangladesh Since Independence, December 1971 through June 1981, Mimeo, June 25, 1981.

[12]Information for this section is drawn from Asian Development Bank, Annual Report - 1981, March 1982.

[13]Project description summarized from Ibid, p. 58.

[14]The information for this section was taken from: USAID, U.S. Bilateral Economic Assistance to Bangladesh: All Years Summary, Mimeo, October 1982.

[15]These estimates are considered tentative by the USAID Program Office since the records from which they were extracted may not be totally complete.

[16]USAID, Audit Report on the Bangladesh Food for Work Program, November 29, 1981.

[17]Estimate by Food and Agricultural Division, USAID, Dhaka.

[18]Information provided by USAID, Food and Agriculture Division.

[19]Halmar Brundin, Food for Work Saturation Level and Constraints to Expansion Study, USAID, Dhaka, October 1978, p. ii.

[20]Institute of Nutrition and Food Science, Economic and Nutritional Effects of Food for Relief Work Projects, University of Dhaka, March 1978, p. 3.

[21]USAID, Audit Report, p. iv. It should be pointed out that the amount of these irregularities is charged to the BDG as demonstrated foodgrain losses occurring under the FFW program are not reimbursed by the United States government.

[22]Blaine C. Richardson, et al., Food Aid Title I and Title III, Project Impact Evaluation, USAID/Dhaka, January-February, 1983, p. iii.

[23]These large scale programs have been seen by some as traditional capital transfer efforts. This may have been true in the early stages of the assistance program, but beginning around 1978, the items were part of a strategy to influence related national policy and distribution programs.

[24]USAID, Family Planning Services: Project Paper, October 1980, p. 1.

[25]The information for this section comes mostly from a mimeo handout obtained at the Japanese Embassy entitled "Japanese Government Assistance to Bangladesh, 1971-81," undated. In possession of Program Office/USAID/Dhaka.

[26]Information obtained from Federal Republic of Germany Embassy paper entitled, Status of Bangladesh-German Cooperation in the Field of Agriculture, undated. In possession of Program Office USAID/Dhaka.

[27]Information from personal interview with the First Secretary for Development, Canadian High Commission, Bangladesh, June 21, 1982.

[28]Information obtained from Office of British High Commission in form of a paper entitled, Summary of Existing Projects, undated. In possession of Program Office USAID/Dhaka.

[29]Sweden Embassy, Development Cooperation Between Sweden and Bangladesh, mimeo., February 1982.

[30]DANIDA-Mission, Status Report on Bilateral Cooperation Between Bangladesh and Denmark, mimeo. November 1981.

[31]The 1982 Ready Reference Directory for VOLAGS, published by the Agricultural Development Agencies in Bangladesh (ADAB) lists 184 organizations. However, the lists include autonomous and semi-autonomous BDG institutes as well as FAO and Foundations. Our best count from the list is about 100 traditional type volunteer organizations.

[32]Provided by USAID Program Office.

[33]Ministry of Finance and Planning, Flow of External Resources into Bangladesh, November 6, 1981, p. 16.

CHAPTER 8
THE HUMAN CAPITAL AND SCIENCE BASE IN AGRICULTURE

"A nation's success in extending the agricultural revolution to all its regions will depend in large part on its ability to produce substantial numbers of people who command basic farming skills, who are well grounded in agricultural science and technology, and who are oriented to acting fast."

Sterling Wortman and
Ralph W. Cummings, Jr.
International Agricultural
Development Service

Introduction

Most formal models, as well as less sophisticated explanations of economic growth, have generally given special emphasis to the role land and capital play in the developmental process. Certainly this was the case with many early economic philosophers,[1] and land is a central ingredient in the events proposed by Malthus which some latter day prognosticators see as the eventual fate of heavily populated nations such as Bangladesh.

Fortunately, these early formulations were faulty. The capacity to meet increasing food and fiber demands has been successfully demonstrated in several parts of the world, and the potentials for the less-developed regions are not without reasonable probability. A major contribution to the improved production possibilities has been the realization that human capital has much greater value and that land and other natural resources are relatively less important than earlier thought.*

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*Human capital includes all degrees of human capacity to confront issues and solve problems with an intellectual response ranging from the ability to read and write to a more sophisticated expertise to apply scientific processes in matters associated with natural, political, and social phenomena.

It is now generally accepted that the natural resource base is not the most limiting factor in economic development. Several examples clearly illustrate this assertion. The city states of Hong Kong and Singapore have survived and produced significant levels of economic well-being with a very minimal land resource. Japan has overcome its limited land/man ratio to become one of the strong economic forces among the nations of the world. Japan's recovery from the devastation of World War II, and also that of Germany, was not the consequence of special land and natural resource wealth. It was people that created the rebirth, just as the strength of the city states today has been made possible by human elements. It is people, properly trained and motivated, who have made land much more productive than before and created much of the wealth of the richer nations and the hope of the less-developed regions.

The importance of education and the development of human capital has been empirically demonstrated by several studies. One landmark study which compared growth performances among eleven developed and nine less-developed nations found that the investment in education and scientific development was the singularly most important variable in explaining variations in agricultural productivity among these nations. It was more important than either resource endowments or technical inputs. As the author of the study observed:

> Productivity differences in agriculture are increasingly a function of investments in the education of rural people and in scientific and industrial capacity rather than natural resource endowments. Indeed, the one inescapable implication of the results of our cross-country analysis is the importance of literacy and schooling among agricultural producers and of technical and scientific education in the agricultural sciences.[2]

One valuable product of increased investment in human capital is the potential for augmenting the capability of the research, extension, and science institutions so important to agricultural growth. Without the capability to produce new streams of technical knowledge, agronomic constraints will persist with little or no basis for increasing productivity and output in agriculture.

The solution to improving the productivity of the agricultural sector is to increase the human capacity of the population by investing in its development. Such an option is especially viable to a land-scarce nation such as Bangladesh. To do so opens up numerous alternatives for resolving constraints to agricultural growth. As T.W. Schultz, Nobel Laureate in Economics, observed:

> I am neither pessimistic nor optimistic about agricultural prospects. In my thinking, as I have already suggested, they will not be determined by the space, by land suitable for crops, or by energy. A decisive factor will be the abilities of people, and on that score, the prospects are open ended.[3]

This chapter focuses on this critical element, human capital, and the closely related capacities of BDG education, extension, and research institutions serving agricultural and rural people. The system of higher education is given special attention in view of the training it provides for people who comprise the science base for agriculture.

The Educational System in Bangladesh

Like so many institutions in Bangladesh, the educational system is a British legacy which survived the Pakistan years and has emerged within the structure of an independent nation. The systems of organization and grading plus much of the curriculum have persisted through the years. Unfortunately, the educational system has not proven very beneficial for a large proportion of the populace. Only about 22 percent of the population over fifteen years of age possess basic literacy, and women are considerably more disadvantaged than men. Even smaller proportions of the population have had the benefit of a primary education, and a much lesser number have reached high school and university levels. Overall, the educational system has not contributed as it should to the development of agriculture in Bangladesh or to the establishment of a scientific base for the sector.

The Organization of Education

The entire formal educational system is under the jurisdiction of the Ministry of Education (MOE), despite the fact that many of the schools are nongovernmental. The possible exception could be the Bangladesh Agricultural University (BAU) which may be placed under the MOA. The system has three main levels, primary, secondary, and higher education. Outside of the mainstream of education, but under MOE jurisdiction. the Madrasha provide religious as well as secular training at both primary and advanced levels of study.[4] Additionally, the system provides for vocational, technical, and professional courses of study within various degree, diploma, and certificate programs. Mass literacy and community school programs are also under the direction of the MOE.

The system is possibly unique in the world with its management and financial structure. Primary schools and universities are mainly supported by public funds, while most regular secondary schools, religious units, and a few intermediate degree programs are mostly under private management. However, the private groups receive some support from the BDG through the Directorate of Public Instruction (DPI), primarily in the form of salary support for teaching and administrative personnel. Upwards of 50 percent of salaries for secondary teachers are paid by governmental funds.

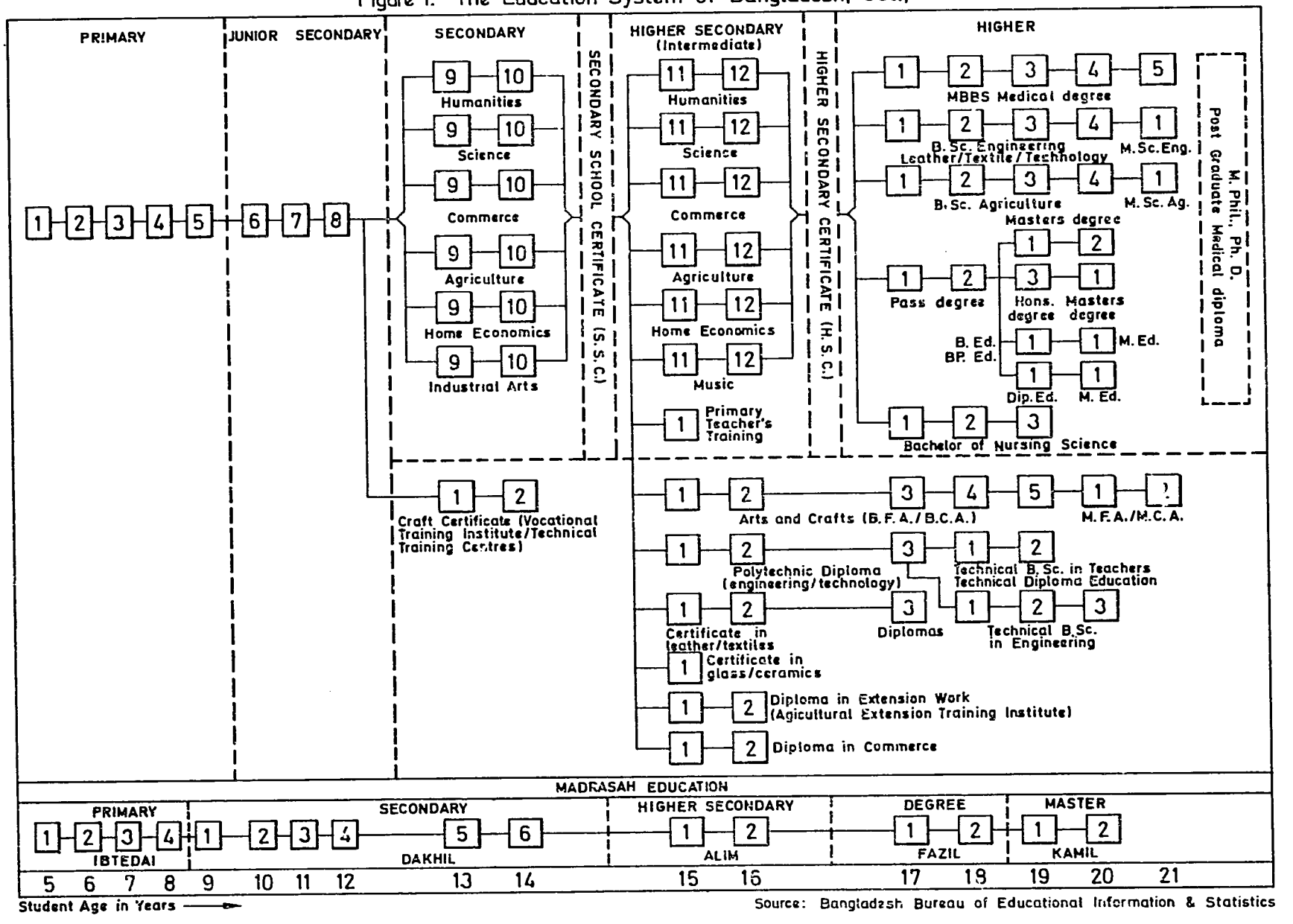
Students enter the primary system at age five. The primary sequence lasts five years and is normally followed by a second five-year period which can be segregated into junior high school (three years) and high school (two years) (Figure 1). A final two-year period, higher secondary, permits a student to complete a twelve-year sequence which is roughly equivalent to the system found in the United States. The system is flexible and provides for intermediate certificates in vocational areas prior to year twelve. Also, the intermediate college years have added flexibility to meet particular student needs. The organizational structure includes degree colleges as well as intermediate colleges. Degree colleges also offer four-year post-intermediate degrees. However, degree colleges are separate entities from the nation's system of universities.

All secondary schools, intermediate, and degree colleges offering intermediate training must affiliate with regional boards of intermediate and secondary education for academic and examinational purposes. There are four such MOE boards located in Dhaka, Rajshahi, Comilla, and Jessore. All schools offering general education are obligated to follow syllabi and curricula outlines as prescribed by the respective boards. The boards are entirely autonomous in their academic and administrative operations, but their general scheme of studies is uniform. All students must stand for public examinations which fall under the authority of these four boards. The first examination is held at the end of the tenth grade, whereby successful participants are awarded a secondary school certificate (SSC). The second public exam follows the twelfth year and successful candidates receive a higher secondary certificate (HSC).[5]

After secondary study and successful completion of the HSC examination, a student may pursue higher education in "honors" or "pass" bachelor's programs. A pass bachelor's degree requires two years study and an honors degree three years. A master's degree is available with one year added study after an honor's degree and two-year study beyond the pass bachelor's program.

The course sequences for the study of medicine, engineering, and agriculture do not follow that of the traditional pass and honors degree. A bachelor's degree in engineering or agriculture is only offered as an honors option and requires four years of study plus one additional year for a master's degree. A medical

Figure 1. The Education System of Bangladesh, Oct., 1982.



Source: Bangladesh Bureau of Educational Information & Statistics

degree in either homeopathic or modern medicine involves a five-year program of university study.[6] Two years of successful medical study beyond this level leads to a Master of Philosophy degree (M.Phil) in anatomy, physiology, pharmacology, micrology, pathology, or biochemistry. An added option is to pursue specialized medical study for three years in the Institute of Post Graduate Medicine and Research, following two years of medical practice. Students who successfully complete this course of study qualify as a fellow or member of the College of Physicians and Surgeons a specialty in such fields as surgery, obstetrics, and pediatrics.

Academic control of all higher education rests with three universities, i.e. University of Dhaka, University of Chittagong, and University of Rajshahi. The Agricultural University at Mymensingh has jurisdiction only in agriculture. The other two universities, Jahangirnagar University (Savar) and University of Engineering and Technology (Dhaka), are primarily teaching universities.[7]

The educational system offers a wide range of options for technical as well as teacher training. Technical instruction is organized into three phases: certificate, diploma, and degree. Numerous vocational, monotechnical, and polytechnical institutes offer courses ranging from one to three years. Teacher training is available at the bachelor's equivalent from the Institute of Education and Research (IER) or on up to master's and Ph.D. degrees. The primary training institutes (PTI) offer a one-year course beyond the SSC to prepare teachers for primary grades. Additionally, there are teacher training colleges (TTC) for secondary teachers which offer a one-year course for a Bachelor of education. The minimum qualification for admission is a pass bachelor's degree at the university. Finally, the Bangladesh Education, Extension, and Research Institute (BEERI) at Dhaka conducts in-service, short-term training courses on different topics and disciplines for both secondary and college teachers. The Academy for Fundamental Education (AFE) and the newly organized Institute for Educational Administration (IEA) provide short courses for primary teachers and educational administrators.

Two nonformal educational programs are of special importance to the rural sectors of Bangladesh. Both are directed to the adult population. The mass education program is intended to attack the high illiteracy rate. The concept of a community school has been developed to promote linkages between the structures of formal and informal education and provide training opportunities for adults and dropouts who want to continue some type of formalized education.

The Institutional Profile for Education

There are about 600 colleges which offer most of the intermediate, two-year sequences for grades eleven and twelve, and the polytechnic studies (Table 8.1). Some degree colleges offer both intermediate study as well as four-year degree courses. About 80 percent of the intermediate college group is nongovernmental. Other college level institutions provide professional and technical training beyond high school. Of the 140 colleges, only 40 (29 percent) are nongovernmental and they offer degrees exclusively in law and homeopathic medicine. Among the government supported colleges, seventy-one are technical institutes. There are twelve medical and dental colleges and ten teachers training units. Agriculture has one college in Tejgaon which is being moved to a new campus at Joydepur (the Agricultural University at Mymensingh establishes the curriculum, syllabus, and general academic standards). Almost all of the vocational and training institutes above year twelve are BDG operated as are the six universities. The religious educational institutes are predominantly private sector.

At the secondary level there are 9,014 schools of which 8,788 (97 percent) are nongovernmental. All of the vocational training for grades nine and ten, however, is handled by fifty-four BDG operated units. The relationships reverse at the primary school level. Of 43,937 primary schools, 36,666 (83 percent) are under public sector jurisdiction. The rural/urban distribution of primary schools is not known for 1981-82, but a 1978 survey which estimated 40,445 total primary schools found that 94 percent were in rural areas. The primary schools were also distributed quite equally among divisions with 28 percent in Chittagong, 27 percent in Dhaka, 23 percent in Khulna, and 22 percent in Rajshahi.[8]

In 1981-82, the Bangladesh educational system had jurisdiction over 56,385 schools of all types and at three general study levels of which only 66 percent had public management. These schools accommodated 10.9 million students with 66 percent attending government-operated schools. The total school system had slightly more than 333,000 teachers in 1981-82. Primary schools averaged 4.28 teachers per school for the five grades. Secondary schools averaged eleven teachers per school, or slightly more than two per grade. The differences in number of teachers per grade between BDG and nongovernmental schools were not significant.

Enrollment

The general enrollment profile since 1973 has not been encouraging and does not reflect overall improvement in the condition of education in Bangladesh. However, changes within certain study areas have shown improvement.

TABLE 8.1
Number of Educational Institutes, Teachers and Students, Bangladesh, 1981-82

Type of Institute	Number of Institutions		Number of Teachers		Number of Students	
	Government	Nongovernment	Government	Nongovernment	Government	Nongovernment
Primary (grades 1-5)	36665	7271	157032	31211	6986174	1274995
Secondary (gr. 6-10)	172	8788	8600	89788	92421	1867995
Vocational (gr. 9-10)	54	—	258	—	4530	—
College	120	485	5600	6675	95754	145530
(Intermediate [gr. 11-12])	(3)	(263)	(30)	(3123)	(617)	(53373)
(Degree [gr. 11-12 & 13-16])	(102)	(222)	(5500)	(3552)	(95927)	(92157)
(Commercial Section Attached to Polytechnic [gr. 11-12])	(15)	(--)	(150)	(--)	(1210)	(--)
College (above gr. 12)	100	40	2795	382	38411	10542
(Medical/Dental IPGMR)[a]	(12)	(--)	(620)	(--)	(8347)	(--)
(Engineering)	(4)	(--)	(152)	(--)	(1709)	(--)
(Agricultural)	(1)	(--)	(59)	(--)	(397)	(--)
(Law)	(--)	(22)	(--)	(201)	(--)	(5606)
(Teachers Training)	(10)	(--)	(196)	(--)	(2639)	(--)
(Vocational & Primary Teacher Training Institute)	(48)	(--)	(750)	(--)	(7125)	(--)
(Technical Institute)[b]	(24)	(--)	(1008)	(--)	(1602)	(--)
(Homeopathic)	(--)	(18)	(--)	(181)	(--)	(5036)
(Physical Education)	(1)	(--)	(10)	(--)	(173)	(--)
University (above gr. 12)	6	—	2412	—	37108	—
(General)	(4)	(--)	(1813)	(--)	(31060)	(--)
(Agricultural)	(1)	(--)	(373)	(--)	(3407)	(--)
(Engineering & Tech.)	(1)	(--)	(226)	(--)	(2641)	(--)
Religious (gr. 1-16)	2	2682	86	28413	750	380013
TOTAL	37120	19266	176853	155469	7237368	3679175

Source: Bangladesh Bureau of Educational Information Research and Statistics, "A Handbook of Educational Statistics of Bangladesh, 1982"; University Grants Commission.

[a]IPGMR = Institute of Post-Graduate Medicine and Research.
[b]Technical Institutes include: (1) College of Leather Technology; (2) College of Textile Technology; (3) Polytechnic Institutes; (4) Glass and Ceramic Institutes; (5) Graphic Arts Institutes; (6) Commercial Institute; (7) Survey Institute; and (8) Audio-Visual Center.

The most critical concerns arise at the primary level. Since 1973, the growth in primary school enrollment has been only 0.5 percent per year, which is considerably below the population growth of about 2.5 percent (Table 8.2). Consequently, there has been little improvement in eliminating illiteracy in Bangladesh at the primary grades, which is the most logical point for confronting the problem. In addition, considerable inequities persist with respect to educational attainment among subgroups of the society; rural residents and females are still the most disadvantaged. Furthermore, poor teaching does not insure literacy even for those who complete the first five years of primary school.[9] Student enrollment at the secondary level declined slightly for the period since 1973. The low or negative

TABLE 8.2
Student Enrollment in Educational Institutions, Bangladesh, 1972-73 to 1981-82

Type of Institution	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	Annual Rate of Growth
School	**9628000**	**9570000**	**10293000**	**10554000**	**10243000**	**10114015**	**10063095**	**10117705**	**10132177**	**10205085**	**0.41**
Primary (grades 1-5)	7794000	7747000	8350000	8289000	8092000	8228000	8227950	8219313	8236526	8240169[a]	0.51[b]
Secondary (gr. 6-10)	1834000	1823000	1943000	2255000	2151000	1833000	1833591	1896839	1898060	1960416[a]	(-0.03)
Vocational	NA	NA	NA	NA	NA	3015	1554	1553	2591	4500	14.02
College											
Intermediate (gr. 11-12) & Degree (gr. 11-12 & 13-16)	**386000**	**392000**	**293000**	**300000**	**294000**	**227000**	**226794**	**231354**	**243356**	**241074[a]**	**(-5.80)**
College (above gr. 12)	**13105**	**6534**	**9998**	**39044**	**6923**	**35680**	**40053**	**41796**	**41444**	**41484**	c
Medical, Dental, & IPMGR	3304	5247	6500	6745	NA	7273	7273	8137	8347	8867	c
Engineering	1293	1609	1466	2160	1652	1694	2080	2080	1589	1709	2.51
Agricultural	850	506	506	372	NA	NA	248	248	397	397[a]	c
Law	4550	NA	NA	9922	NA	5706	5706	5706	5606	5606[a]	c
Homeopathic	885	1172	1526	2123	2581	5656	5392	4449	4449	5030	22.81
Teachers Training[d]	2223	NA	NA	2874	2690	2895	2785	3625	2639	2639	c
Technical Institutes[e]	NA	NA	NA	14848	NA	13456	16569	17551	18417	17236	c
University (above gr. 12)	**26390**	**29996**	**33717**	**27982**	**27346**	**28290**	**29228**	**30699**	**36530**	**37108**	**2.5**
General	22552	25743	29683	23451	23988	24190	24930	26165	31101	31060	2.3
Agricultural	1936	2486	2321	2371	1706	2406	2408	2296	3046	3407	4.2
Engineering & Technology	1902	1737	1713	2160	1652	1694	1890	2238	2383	2641	3.8
Religious	**271234**	**NA**	**NA**	**291191**	**NA**	**386650**	**440800**	**354086**	**363468**	**380763**	**c**

Sources: Bangladesh Bureau of Educational Information Research and Statistics; University Grants Commission.

[a]Estimated.
[b]Estimated by least-squares trend line.
[c]Not calculated due to trend distortions caused by missing data for some years.
[d]Up to 1978 there were 6 TTC and 6 colleges of education. From 1979 they were transferred into 10 TTC & Academy for Fundamental Education.
[e]Includes: (1) College of Leather Technology; (2) College of Textile Technology; (3) Polytechnic Institute; (4) Glass and Ceramic Institute; (5) Graphic Arts Institute; (6) Vocational Training Institute; (7) Commercial Institute, Dhaka; (8) Commercial Section Attached to Polytechnic Institute; (9) Survey Institute; and (10) Audio-Visual Center.

growth rates for the primary and secondary levels are only partially indicative of the educational problems in Bangladesh.

The problem is more clearly demonstrated by a comparison of the matriculation of students between grade levels (Table 8.3). In 1981-82, only an estimated 67 percent of the children in the age group from 5-9, which corresponds to school grades 1-5, were actually enrolled. Therefore, 33 percent of the potential students for these early grades were not in school. The highest dropout rate generally occurs before grade 3.[10] Moreover, the 1981-82 level of enrollment for grades 1-5 was less than in 1974-75, and the proportion of the age group in school had declined from 76 to 67 percent.

The situation worsens considerably between the primary and secondary levels. In 1981-82, only 18 percent of the population age 10-14 which should normally attend grades six to ten were enrolled. This means that 49 percent of the students dropped out of school between grades five to ten and, furthermore, that 82 percent of the student population will not complete grade ten and qualify for the public exam to obtain a secondary school certificate. Going one step further through the system, an additional 12 percent dropped out between grades ten and twelve. In the end, only 6 percent of those ages cohort 15-16 were enrolled in grades 11-12. For grades one to twelve, only 38 percent of the children ages five to sixteen were enrolled in 1981-82. This was down 4 percent since 1974-75.

The high dropout rates at the primary and secondary levels are indicative of fundamental inadequacies in the educational system. Most teachers are not properly trained or supervised, Few teachers are women. Only one-third of the teachers are estimated to have some formal training, and the instruction is not always adequate.[11] Teacher salaries are too low to promote career interests. Instead, the system encourages outside employment. Absence from the classroom is not uncommon among primary teachers. Facilities are inadequate, especially supplies and textbooks. The curriculum still reflects a traditional training orientation which emphasizes literature and arts instead of vocational agriculture, rural knowledge and skills.

At the same time there is a high opportunity cost for education among many rural residents who find the foregone income and direct costs associated with education too high to be returned by increased earning potentials from education. The current economic order does not sufficiently reward, educational advantages. The situation is likely more grievous in the rural regions where school time is often a substitute for time spent in the fields, and even minimal book and clothing costs for school are significant expenditures for the rural family. Put in total perspective, the educational experience of the first few years is too often found wanting with high opportunity costs and low anticipated returns.

TABLE 8.3
School-Age Population and Enrollment for Various Grades, Bangladesh, 1974-75 & 1981-82

	1974-75	1981-82
Population aged 5-9	10926944	12295517
Enrollment grades 1-5	8350000	8240169
Percentage enrolled	76	67
Population aged 10-14	10841472	10938073
Enrollment grades 6-10	1946015	1960416
Percentage enrolled	19	18
Population aged 15-16	3436790	4133845
Enrollment grades 11-12	19298	241074[a]
Percentage enrolled	1	6
Population aged 5-16	24845206	27367435
Enrollment grades 1-12	10315313	10441659
Percentage enrolled	42	38
Population aged 17-20	5155185	6200768
Enrollment grades 13-16	NA	78592[b]
Percentage enrolled	NA	1

Sources: Bangladesh Bureau of Statistics, **Population Projection of Bangladesh, 1975-2025**; and Bangladesh Bureau of Educational Information Research and Statistics.

[a]Includes students from intermediate, degree, and commercial section attached to Polytechnic Institute. Comparable estimates not available for 1974-75.

[b]Includes students from medical, dental, and IPGMR college, engineering college, agricultural college, law college, homeopathic college, physical education, teachers training college, technical institutions, four general universities, agricultural university, and engineering and technical university.

Growth in the other levels of the educational system since 1972 have generally fared better than those in the primary and secondary sections (Table 8.2). The greatest expansion was in medically related training. Enrollment in homeopathic medicine increased 23 percent per year and for medical training about 10 percent. Enrollments of technical trainees were up by 5 percent since 1978. Agricultural students in college degree programs

fell somewhat since 1973, but university agricultural enrollment rose by about 4.2 percent per year, with significant increases since 1979. Still, agricultural enrollment was also among the lowest in the combined college degree and university programs (those above grade twelve). In 1981, only 5 percent of approximately 79,000 students were enrolled in agricultural programs. By comparison, 22 percent were in technical institutes, 18 percent in medical and homeopathic studies, and 40 percent in general university programs. Overall, university enrollment has grown by 2.5 percent annually.

Investment in Education

The problems with education in Bangladesh are, in significant part, explained by the lack of investment in public education. The inadequacies of teaching facilities, supplies, and to, some extent, those of management and curriculum can be traced to the inadequate budget of the BDG. The investment in education not only determines the physical structure and facilities of the system, but it also conveys an attitude toward education which has an important impact on the performance of those responsible for the system. The unique private-public financing arrangement of education in Bangladesh makes it difficult to clearly assess the adequacy of the combined investment as data on the private investments are not available.

Since 1974, the commitment to education by the BDG has remained essentially unaltered. Despite the obvious need for improvements, no special priority has been given to educational programming during the last few years by increasing educations share of the budget. From 1975-81, the recurrent budget share to education has generally been in the range of 13 to 14 percent of the total budget. In 1981, this amounted to about Tk. 2.0 billion (Chapter 6, Table 6.1). Only defense and general administration received higher amounts.

Education has not fared so well in the ADP budget. Since 1975, education has received from 4 to 5 percent of the ADP funds, which in 1981 totaled Tk. 970 million for educational development (Table 6.5). The combined recurrent budget and ADP allocations for 1981 (Tk. 2.9 billion) amounted to a per capita commitment of Tk. 266 (about $13) for each of the 10.9 million students enrolled in the educational system during the year.

The actual disbursement of ADP aid for education during 1974-80 has ranged from 2 to 5 percent of the total ADP budget. In 1976 and 1977, disbursements were 1 percent above the ADP budget allocation, and in 1978 and 1981, they were 1 percent below.[12] Also during the period 1974-80, only 64 percent of the planned ADP budget was allotted and 57 percent was actually expended (Table 8.4). As a result, total expenditures per student were closer to $11.70 than the budgeted $13.

TABLE 8.4
Development Expenditures on Education and Training, Bangladesh, 1974-80

Level of Education	Development Expenditures 1974-80			Recurrent Expenditures	
	Planned Allocation	Actual Allocation	Actual Expenditure	1974	1980
	[million taka and (%)]				
Primary	800	368	341	391	901
	(17.6)	(12.7)	(13.2)	(60.2)	(50.1)
Secondary	886	351	301	90	307
	(19.5)	(12.1)	(11.6)	(13.9)	(17.4)
College	385	172	148	39	155
	(8.6)	(5.9)	(5.7)	(6.0)	(8.8)
Teacher training	282	102	79	--	--
	(6.2)	(3.5)	(3.1)	--	--
Other educational activities	185	494	480	--	--
(DPI)	(4.1)	(17.1)	(18.5)	--	--
Technical education	886	595	471	NA	NA
	(19.5)	(20.6)	(18.2)		
University education	572	691	683	67	236
	(12.6)	(23.9)	(26.4)	(10.3)	(13.3)
Other schools of Ministry	542	123	86	62	169
of Education	(11.9)	(4.2)	(3.3)	(9.6)	(9.6)
TOTAL	**4538**	**2896**	**2589**	**649**	**1768**
	(100.0)	**(100.0)**	**(100.0)**	**(100.0)**	**(100.0)**

Source: World Bank, Report No. 3768-BD, March 3, 1982, p. 58.

Note: Figures in parentheses are percentages of the total.

Expenditure of BDG funds among the various levels of the educational system has generally favored the universities (Table 8.4). The planned allocation to the universities for the 1974-80 period averaged 12.6 percent of the total programmed, but the average disbursement was 26.4 percent of the actual expenditures. Similarly, expenditures from the recurrent budget for the university system rose from 10.3 percent in 1974 to 13.3 percent in 1980. Primary education which had a planned allocation of 17.6 percent actually expended only 13.2 percent of the ADP funds. Furthermore, recurrent budget expenditures declined from 60.2 percent to 50.1 percent for primary education between 1974-80. Secondary schools dropped from 19.5 percent planned allocation to 11.6 percent expenditure of ADP funds but increased from 13.9 percent to 17.4 percent of the recurrent budget for the period.

Present Programs

The educational programs of the BDG have undergone considerable evolution since 1971 in an attempt to define both the nation's objectives and operational plan. Perhaps the strongest consensus arose from the nationwide debate in 1978, under auspices of the Education Advisory Council, which concluded that mass education should be oriented towards practical needs. To make education more relevant and effective, the major objectives of the BDG developmental plans have been defined to emphasize the following: (1) eradication of illiteracy; (2) introduction of universal primary education and nonformal education for dropouts and adult illiterates; (3) population and environmental education; (4) strengthening of vocational, technical, and science education; and (5) increased training of the female population.

More recent proposals by the government reaffirm the council's report of 1978 and incorporate updated proposals. One such proposal is the integration of all individual subjects in the secondary years (ninth and tenth grades) into a general curriculum, except for science which will continue as a special course of study. This change is expected in 1983. A proposed change which has created more controversy is the addition of Arabic beginning with one and English with class two as compulsory subjects. Those opposed argue that the requirements will detract from the study of Bangla (the language of Bangladesh) and reduce language competence even more.

The concern for retention of Bangla as a first language has deep significance to the people of Bangladesh which grows out of conflicts following partition in 1947. The leadership of newly created Pakistan decreed that Urdu, the language of the Western region, would be adopted nationwide, thus, eliminating Bangla from the schools and regional life of the Eastern section. The conficts which resulted were intensified over time and culminated

in open hostilities on February 21, 1952, when rioting in several parts of East Pakistan resulted in the death of students and populace supporters. The language movement eventually succeeded in retaining Bangla as an official language, but the events of that era and the losses of February 21 have become memorialized in a national day of remembrance. Some have even argued that the Language Movement was the beginning of events which eventually led to the War of Liberation.[13]

The current focus of the BDG plan for improving the educational profile in Bangladesh is on four principal programs: (1) technical education; (2) universal primary education; (3) mass education for adults; and (4) introduction of scientific and vocational training at the secondary level. The proposed programming will severely tax the capacity of the BDG and donors alike to provide the sustained commitment needed to make a meaningful impact on the mammoth problems confronting education in Bangladesh.

The technical educational programs are intended to improve the balance in the mix of skills produced by the system and to improve the relevance of student training. Presently, the curriculum gives disproportionate attention to theoretical training and does not adequately reflect the employment requirements of either the public or private sectors. Also, it is estimated that Bangladesh has only 30,000 scientists, engineers, and technicians plus about 100,000 skilled workers.[14] The migration of significant numbers of people with these skills to the Middle East has already created some shortages, and the continued outflow will require a stepped up output by the technical institutions. To help meet these needs, the capacity of the engineering university and colleges will be augmented under the program as will some of the polytechnic institutes including the establishment of a new women's polytechnic unit.

The universal primary educational program originally envisioned enrolling up to 90 percent of the eligible primary age groups of children by 1985. More recent plans, however, envision 50 percent enrollment by 1987, with the larger target being projected for the early 1990s. The first phase has been initiated in forty thanas. The total project eventually calls for the appointment of about 150,000 new teachers and 2,000 educational officers, training of over 55,000 teachers and supervisors, construction of 10,000 new classrooms and 1,600 new schools, renovation of 14,000 old schools, digging of about 17,000 tubewells for drinking water, provision of textbooks to 18 million children, and provision of uniforms to about 5.5 million girls.[15] Whether or not students attain functional literacy in the primary years and establish a base for continued education at the secondary level depends in large part on improvements in teaching quality and increased attendance by the students. Planned curriculum changes also also become effective.

The mass educational program for adults will attempt to bring functional literacy to 40 million Bangladeshis between ages eleven and forty-five. Earlier plans to engage in a highly structured program with considerable BDG financial support have been set aside in favor of placing more program responsibility with village governments on a self-help basis. The MOE will provide training and supervisory help plus textbooks. Mass Literacy Centers have been opened in many villages where voluntary teachers, mostly educated local youth, teachers, and social workers do the teaching. Night classes are most common. Simple reading, writing, and arithmetic are taught. Furthermore, 400 community schools are being developed to offer an assortment of both general and skill courses. A principal clientele for this program is the extensive number of students who leave the system early, either by dropping out or failing to pass the SCC public examination. The community school offerings permit successful participants to move on to various technical and vocational programs offered by the educational system.

The increases in scientific and vocational training in the secondary schools are intended to put this phase of the system more in tune with the needs of the labor markets so that secondary study can be a more adequate preparatory step before leaving formal education. Private schools are an essential element to this focus since most secondary schools where these subjects will be taught are privately operated. They are scheduled for additional BDG support when the new courses are introduced.

Special Education Institutions Serving Agriculture

In a predominantly agrarian society like Bangladesh, almost all formal institutional training impacts in a fairly direct way on the agricultural sector. Certainly, the rural primary and secondary schools contribute significantly to the creation of whatever human capital exists in agriculture[16] as does a portion of the training in higher education. Additionally, Bangladesh has other types of institutions which provide specialized training of consequence to the sector.

Agriculture benefits in a particular way from the output of the system of higher education. As a public institution, the system of higher education should be a servant of society by insuring a repository of existing knowledge and by discovering new knowledge so that both can be passed on to its students and society at large. In this role, the university becomes the apex for all segments of society which rely on a continuing flow of updated information. The university's faculty discovers new knowledge and develops and trains students to perform the same functions in other institutions, be they public or private.

Agriculture is highly dependent on the generation of new knowledge and information and, therefore, is influenced by the university system and two other closely associated public institutions--research and extension. These three interrelated systems comprise an indispensible input to the growth and development of agriculture. Along with several other more vocationally oriented educational institutions, they form the training network of most direct importance to agriculture.

Higher Education

The system of higher education is comprised of six universities of which four have faculties in the general areas of arts and sciences. Two universities cater to the special needs of professional education, one in engineering and technology and the other in agriculture. In 1981, there were 37,108 students enrolled in the university system of which about 20 percent were female (Table 8.5).[17]

Growth in student enrollment at the six universities has been fairly consistent but not dramatic since independence. The average annual increase has been 2.5 percent since 1973 (Table 8.2). The University of Dhaka and the University of Rajshahi dominated the total enrollment in 1981 with 67 percent of the students 1981 (Table 8.5). The Agricultural College at Mymensingh had only 9 percent of the total university enrollment.

Most students who graduated in 1981 did so with a pass bachelor's degree, which is the least technical of the undergraduate options. About 68 percent of the 24,938 undergraduate degrees awarded were in this category. Honors degrees (including Bachelor of Science) totaled 32 percent. Only 0.4 percent of the undergraduate degrees and 1.3 percent of the honors degrees were taken by students at the agricultural university. About 6,400 graduate degrees (including medical) were completed, but only 2 percent were awarded in agriculture. Some type of degree was granted to 31,362 people in 1981, or almost 85 percent of the students enrolled. This reflects both the high proportion of students associated with the two-year pass bachelor's degree option and the backlog of students awaiting final testing and graduation as a result of delays caused by periodic closure of the university system.

Overall, the proportion of faculty with advanced academic training is not sufficient, and there is concern for the academic qualifications of the faculties and the associated quality of education produced by the system (Table 8.6). Of the 2,400 faculty members in the system in 1981, 26.2 percent held Ph.D. degrees, and an additional 24.7 percent held a lesser postgraduate degree or diploma. By most standards of developing nations, this percentage is high and speaks well for the potential quality of education in the system. Academic inbreeding among faculty with Ph.D.s is likely minimal since most

Number of Students and Type of University Degree Obtained, Bangladesh, 1981

University	Year Founded	Students Enrolled	Type of Degree: Pass Bachelor	Honors Bachelor	Bachelor Science	Master Science	Medical
Dhaka	1921	14570	6712	3731	--	3562	399
Rajshahi	1953	10237	7253	2312	--	1879	147
Agricultural	1961	3470	--	--	106	145	--
Engineering	1962	2641	--	--	369	14	--
Chittagong	1966	5074	3084	816	96	--	134
Jahangirnagar	1970	1116		82	--	144	--
TOTAL		**37108**	**17049**	**6941**	**948**	**5744**	**680**

Source: Ministry of Education, **Returns from the Universities**, University Grants Commission, November 1982, p. 81.

TABLE 8.6
Number of Faculty by Rank, and With Post-Graduate Degree by University, Bangladesh, 1981

University Name	Professor	Assoc. Prof.	Assist. Prof.	Lecturer	Others	Total Number	Those with Higher Academic Qualifications: Ph.D.	Those with Higher Academic Qualifications: Other Post-Grad. Degree/ Diploma
Dhaka University	80	181	323	175	44	803	272	130
Rajshahi Univ.	41	65	245	87	18	456	110	42
Bangladesh Agricultural Univ.	27	59	206	58	16	366	102	242
Bangladesh Univ. of Eng. & Tech.	27	29	109	102	--	267	63	104
Chittagong Univ.	20	43	175	117	1	356	46	52
Jahangirnagar Univ.	16	20	57	57	2	152	36	23
TOTAL	211	397	1115	596	81	2400	629	293
Percentages	(8.8)	(16.5)	(46.5)	(24.8)	(3.4)	(100.0)	(26.2)	(24.7)

Source: Ministry of Education, **Returns from the University**, University Grants Commission, November 1982, p. 108.

of this group hold degrees from outside Bangladesh. Additionally, the quality of their training is good, and, assuming a reasonably diverse distribution of foreign universities at which the training has occurred, the mix of new concepts and knowledge coming to the system should be acceptable. However, the 65 percent who hold academic rank without advanced degrees and, to some extent, those who hold less than a Ph.D. or equivalent likely are graduates of the Bangladesh system of higher education and have not been exposed to outside training experience. Among this group, the dangers to academic growth and excellence caused by inbred training is much higher.

The academic faculties have a significant number of lecturers and assistant professors. About 71 percent of the total faculty were in these two categories in 1981. Such a distribution is in keeping with the large proportion of nongraduate degree holders among the faculty. It also provides room for career advancement for qualified younger faculty. Most of the faculty are full-time employees of the university, which is a positive aspect for quality education. While low by international standards, salary levels for faculty are competitive with other government positions, status is high, and turnover in faculty is not excessive. The profile of faculty at the agricultural university is almost identical to that of the overall university system.

The limited number of students and degrees in agriculture reflects traditional attitudes toward higher studies, despite the dominance of agriculture in the country. The prevalent attitude is that agriculturists do not need formal education, be they farmers growing rice or extensionists providing advice. (Agricultural researchers are seemingly an exception.) Such ideas are typically found in emerging agrarian societies. Agriculture is not accorded the value given to medicine, law, and commercial studies. Higher education is thought to be more appropriate for these professional degrees and enrollments support this belief. The attitudes are reinforced by the restricted job opportunities available to agricultural graduates in Bangladesh. Employment opportunities for those with bachelors training are limited both in government and the private sector. A high proportion of jobs in agricultural extension is filled with graduates from the AETIs, with only twelve years of formal study. Unlike many developing nations, however, Bangladesh draws a large number of its agricultural students from rural rather than urban areas. The rural farm experience of these students adds a positive factor to their agricultural training.

Bangladesh Agricultural University (BAU).[18] The Agricultural University was established in 1961 with the expectation that it would become the center of scientific output for all agricultural interests in East Pakistan. The university demonstrated promise to fulfill this role, both in research and in training competent Bangladeshis to serve the sector and

enhance agroindustrial progress. The BAU received considerable assistance from USAID and IDA, especially during the 1960s when the base was being placed. Under an AID contract, Texas A&M University provided about seventy person-years of professional help in the basic subject areas of agriculture. The assistance also included formal Master of Science and doctoral training in the United States for forty Bangladeshis.[19] Additionally, USAID and IDA provided resources to develop a modern physical plant, including classrooms, laboratories, a library, dormitories, and staff quarters, plus an instructional and research farm, all of which encompass about 1,000 acres.

Within a decade, BAU was offering bachelor's, master's, and Ph.D. programs comprising about twenty-five disciplines. Significant teaching progress was made, but the quality of the research lagged despite an impressive physical plant and the return of many of the local staff from postgraduate training. The disruptions of the early 1970s associated with the war created severe upheavals in the university program which have not yet been entirely remedied.

A considerable portion of the BAU faculty have been trained abroad, and about 29 percent hold Ph.Ds and 42 percent some type of the postgraduate degree (Table 8.6). Program offerings are concentrated at the bachelor's and master's levels. In 1980, 3,046 students were enrolled. Between 1972-80, only three students were awarded doctorates, and presently only five students are enrolled in Ph.D. programs. Degree programs are provided in six faculties: agriculture, veterinary science, animal husbandry, agricultural economics and rural sociology, agricultural engineering and technology, and fisheries.

The quality of the educational experience is in doubt despite the physical plant and a seemingly qualified faculty. The curriculum is reported to be highly theoretical and inflexible. Students are not taught problem-solving techniques and skills but rather spend an inordinate amount of time in memorizing routine kinds of information. Practical field experience also is lacking. Individual faculties tend to be overly independent with inadequate interfaculty collaboration to provide multidisciplinary training. The lagging research and extension efforts of the faculty do not provide a high quality learning experience. Furthermore, the combination of strikes and student unrest cause periods of university closure and postponement of examinations that disrupt programs and extend the time required for students to complete their degree. These campus upheavals, combined with inadequate BDG financial support, have adversely affected the general morale of the campus. The BAU has seemingly drifted into semi-isolation and now exercises very minimal influence in the agricultural sector.

There has been concern that past affiliation with the MOE may have contributed to the funding difficulty of BAU since agriculture has not been a high priority in the total interests

of the ministry. The physical facilities and faculty base created in the 1960s are still essentially in place and have a high potential for assisting the sector. But the output in teaching, research, and extension is not currently of the standard expected from the available faculty and facilities to establish the science and human capital base for the agriculture sector.

Bangladesh Agricultural College (BAC). The Bangladesh Agricultural College predates establishment of the BAU by 23 years. It was formed in 1938 as the Bengal Agricultural Institute and was the only institution for higher agricultural studies until the creation of the BAU in 1961. Initially, the college was affiliated with the University of Dhaka but now falls under the jurisdiction of the BAU. Studies are offered in thirteen departments which lead to a four-year Bachelor of Science degree. A limited master's program is also offered. About 150 students enter the programs annually, and the average annual enrollment approximates 500 students. Degrees are awarded to sixty to eighty students each year. The training program benefits considerably from the research efforts of BARI scientists.

The college has had chronic institutional support problems. Financial resources have been inadequate and disbursals from the BDG have been late. However, new physical facilities are under construction near Joydepur with assistance provided by Japan. Buildings, laboratories, equipment, and dormitories are in the final phase of construction. A health center, gymnasium, and necessary agricultural equipment also are being provided. The Japanese also are contemplating technical assistance to develop the curriculum and administration of the college, but no final decision has been reached.

Scientists for Agricultural Development. The overall response of the system of higher education is not yet sufficient to underpin the development of human capital and the science base for agriculture. Faculty composition and academic qualifications generally appear to be reasonably good both in the agricultural university and the university system. However, program quality is known to suffer from inadequate physical facilities, laboratories, supplies, and basic text materials for many areas of study. The failure to develop student skills in problem-solving techniques is a critical inadequacy. These deficiencies vary among universities but to some extent, are present in all. The number of students in higher education and, especially, in agricultural programs is a very small percentage of the total population. Such limited enrollments reflect the inaccessibility of the university to many social and economic groups, the high

dropout rates in the primary and secondary grades, and the lack of employment opportunities.*

The most intangible element in assessing the quality of higher education in Bangladesh, but one of considerable importance, is the commitment of the faculty to academia, to scientific processes, and to the development and dissemination of new knowledge. Dedicated faculties are indispensible to quality education and can go a long way in overcoming deficiencies in physical structure and other facilities.

One characteristic of the higher education system which may generally reflect faculty (and student) attitudes is the traditional involvement of the university structure in national politics. Where this occurs, the university is denied its societal role as a center of learning to discover knowledge and impart it to students and society at large. A society needs unbiased critiques to assist its progress. The university is among the best-suited public institutions to fill this role, but it must avoid partisanism and protect its independence and objectivity.

Before Bangladesh can develop the needed scientific base for modernizing agriculture, it will require a continuing flow of sophisticated and qualified human capital to upgrade and maintain programs in a wide variety of public institutions serving agriculture. The responsibility for training this cadre lies mainly with the system of higher education.

Other Agricultural Institutions

In addition to the segments of higher education which train high level agricultural technicians, several other institutions teach personnel which service the agricultural sector. Like the BAU, most have encountered difficulty and have grown without adequate structure and financial support. Unlike the BAU, however, most have generally inadequate facilities.

Agricultural Extension Training Institutes (AETI).[20] Most of the midlevel extension personnel for the Ministry of Agriculture are trained at twelve Agricultural Extension Training Institutes located at Chittagong, Faridpur, Dinajpur, Ishurdi, Khadimnagar, Gouripur, Sherpur, Tajhat, Gaibandha, Natore, Daulatpur, and Tejgaon. Students enroll for a two-year sequence following grade ten (a recent BDG decision will increase the program from two to three years).

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*During the course of this assesment we were unable to find manpower demand studies which document theemployment situation for this level of training.

The AETI faculty normally consists of a principal, six instructors who hold a university bachelor's degree, and five diploma level instructors who are graduates of the AETI system. The curriculum emphasizes both academic and practical training. About 50 percent is classroom instruction, and the rest is devoted to field experience, including demonstration plot preparation and contact with agriculturists in the region of the Institute. There is no formal apprentice field training.

The output of village extension agents (VEA) from the AETIs has shown an upward trend between 1976-81 (Table 8.7). For this six-year period, 3,299 trainees have graduated for an annual average output of slightly over 500. However, the graduates for both 1980 and 1981 numbered in excess of 900. In 1980, 1,668 new students were admitted to the various institutes.

The training facilities vary considerably among institutes but have been inadequate generally. A remodeling and construction program has been started to correct the problem. The renovation, expansion, and equipping of four old institutes at Gaibandha, Daulatpur, Khadimnagar, and Sherpur are being financed by IDA. Likewise, new construction is in process at Chittagong, Ishurdi, and Faridpur under IDA assistance. The Danish Government is financing establishment of a new facility at Begumganj (Noakhali). Finally, other new construction is programmed at Rahmatpur, Joydebpur, and Dinajpur and will be BDG financed. The four old facilities at Tejgaon, Gouripur, Tajhat, and Nator will be retired and, following minimal renovation, will be utilized for in-service training of VEAs and other extension faculty. With the completion of the building and renovation program by 1985, the annual output of graduates is expected to be about 1,300.

The outlook for employment of midlevel agriculturists is good. By 1985, the number of DAEM extension personnel, plus those in other extension-oriented agricultural institutions of the BDG, is projected at 28,000, which is a fourfold increase from the 6,000 to 7,000 agents now working.[21] This projected need is based on a BDG decision to post one VEA per 1,000 crop acres plus the needs of other extension-oriented agencies such as IJCH, HDP, and CDB. Since most midlevel agricultural extensionists are trained at the AETIs, such an increase will severely strain the capacity of these institutions. Without interim expansion of facilities and in program improvements, the projected numbers are unattainable and the graduates will not receive the requisite quality of preparation needed by the sector. Ten new AETIs have been proposed to help meet this need.

Bangladesh Academy of Rural Development (BARD). The Academy was established in 1952 to train agricultural cooperative and local rural governmental officers and staff. It also is responsible for conducting research on administrative problems and methods for promoting rural development. Currently, the

TABLE 8.7
Extension Graduates from Agricultural Extension Training Institutes, Bangladesh, 1976-81

Year	Total Graduates	Cumulative Number
1976	206	206
1977	266	472
1978	461	933
1979	510	1443
1980	901	2344
1981	955	3299

Source: Department of Agriculture, Extension, and Management, "Annual Report 1979-80 and 1980-81," undated, p. 47.

academy is an integral part of the IRDP. It has centers in Comilla and Bogra.

Training activities include: (1) pre-service and in-service training for IRDP officers; (2) training of Thana Central Cooperative Association (TCCA) staff (courses run up to four months for upgrading skills of TCCA officers); (3) management training for TCCA personnel in seven-day courses; (4) training of thana and union level officers and elected officials through seminars and short courses; and (5) training of managers of village societies and model farmers. Associated with BARD in Comilla is the cooperative college which trains field inspectors in pre-service and in-service courses. The college has eight zonal training institutes which conduct short courses for members of cooperative societies and TCCA village accountants. In 1980-81, the college had training courses attended by 963 in Comilla and 2,385 in the eight zonal Institutes.[22]

BADC Staff Training Institute. The institute is located on the BADC seed production farm at Madhupur. It was organized in 1970 to train BADC personnel in a wide range of subject matter areas including administration, financial management, and a range of technical subjects, i.e., seed technology, fertilizer, irrigation, and pump repairs and maintenance. More than 3,000 BADC personnel have been trained under the auspices of the institute.

Thana Training Development Centers (TTDC). These centers are located in about 60 percent of the thanas of Bangladesh to

provide continuous training for area farmers. Those eligible to receive training are model farmers, cooperative societies' chairmen, and Thana Irrigation Project (TIP) groups, including pump operators and tubewell attendants. The training consists mostly of lectures by thana level officers, primarily those with agricultural specialities. Field demonstrations are intended, but are in reality a minimal part of the program due to limited land and the inadequate training of instructors in field demonstration techniques. The competence of the instructors overall, however, seems sufficient to encourage participation by a substantial segment of the local eligible participants.

Other programs offer some training of farmers and other groups of agricultural sector personnel. BARI and BRRI both have training components for extension and district officers in on-farm research techniques and rice-based cropping systems. The Institutes of Fisheries, Forestry, and Hydrology all offer a variety of short courses and in-service training programs to meet the special needs of producers, administrators, and others associated with these industries. A considerable amount of training activity also is carried on by a wide range of PVO groups.

The Agricultural Research System

Agricultural research in Bangladesh has a tradition dating back to the years prior to partition from Great Britain. In those years, the area benefited from the research and development efforts of the Imperial Council of Agricultural Research, which had been established in 1929 by Britain to service the needs of all of the subcontinent. But with independence in 1947, the total agricultural research and university system was decimated by the loss of large numbers of expatriate scientists who had provided most of the leadership and professional input for the institutions located in both East and West Pakistan. The Agricultural Research Council of Pakistan (ARCP) proved incapable of raising the level and quality of research output, and few truly meaningful investigations were accomplished in the Eastern part of Pakistan for more than twenty years.[23] Review teams came in the late 1960s to propose changes which would strengthen the AACP, but the disarray continued and progress was postponed by the 1971 War.

The agricultural research capability in Bangladesh today, including the physical plant and professional competence, has been established during the last ten years. Serious attempts to restructure the research capacity began in about 1973, and meaningful research work did not begin until around 1975. By most standards, this is a relatively short time frame for building a quality investigative capacity. Many aspects of the

research plant in Bangladesh are impressive given its short gestation period. While certain deficiencies still exist, the potentials appear good for the emergence of an effective research base.

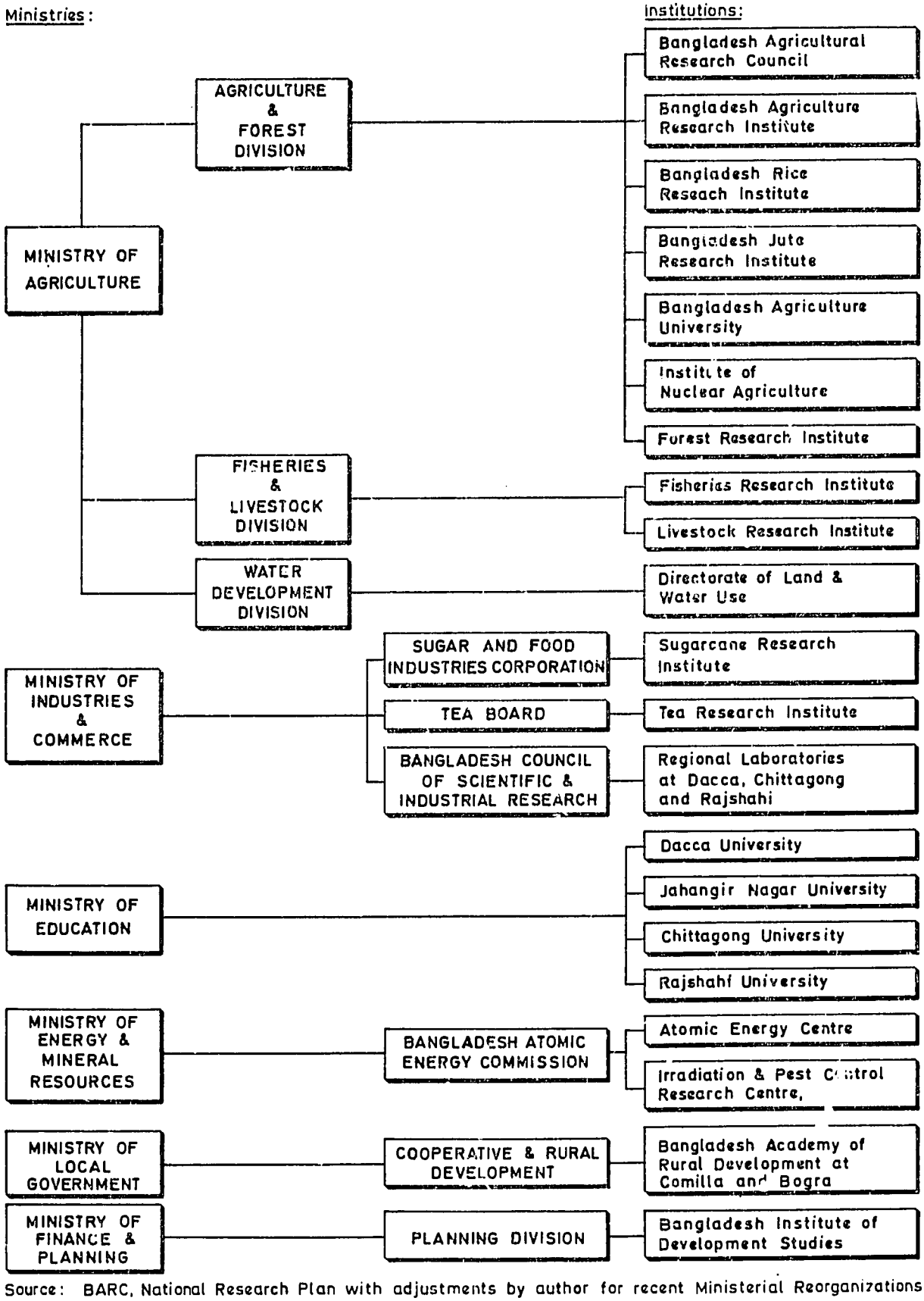
The Organization of Research

The agricultural research system in Bangladesh is composed of twenty-one autonomous or semiautonomous institutions which conduct research under the administrative responsibility of six ministries (Figure 2). The research activities range from traditional agronomic investigations to specific studies of economic growth to the application of nuclear energy to agriculture. As a consequence of the recent BDG reorganization, ten of the research institutions now fall directly under the jurisdiction of the MOA.[24]

Most of the agronomic and related kinds of agricultural research is carried on by nine major research institutes which are mainly monocrop facilities. Individual institutes are committed to research in rice, jute, sugar, livestock, tea, fisheries, forestry, and nuclear energy. Only one institute (BARI) has a reasonably integrated crop research focus (Figure 3).

The diffusion of research among such a large number of agencies and ministries has created problems of coordination and effective administration. To correct this problem, the BDG established the Bangladesh Agricultural Research Council (BARC) in 1973 as an autonomous body. BARC is technically under the jurisdiction of the MOA, but its governing council and review committees come from representatives of the agricultural research institutes. BARC is responsible for the coordination of all agricultural research based on criteria set forth by the BDG. Historically, BARC has lacked enforcement power over the research programs of the diverse institutes. However, the effectiveness of BARC as a national coordinating body has been steadily improving. In 1979, BARC published its first national research plan. More recently, BARC established five nationally coordinated programs in farming systems, pulse research, soya research, soil and water management, and socioeconomic research designed to better focus research. These efforts have contributed to the leadership role which BARC exercises with the national research network. Its eventual goal is to consolidate all research efforts into a highly organized and integrated unit which addresses cost effective solutions to food production contraints. The evolving system of loosely structured agricultural research activities will be stabilized within each of the research institutions and linkages will be established among institute programs using guidelines established by BARC. Manpower development is administered by the BARC training cell which coordinates advanced academic training of Bangladeshi

Figure 2. Institutions Conducting Agricultural Research in Bangladesh, Oct., 1982.



Source: BARC, National Research Plan with adjustments by author for recent Ministerial Reorganizations.

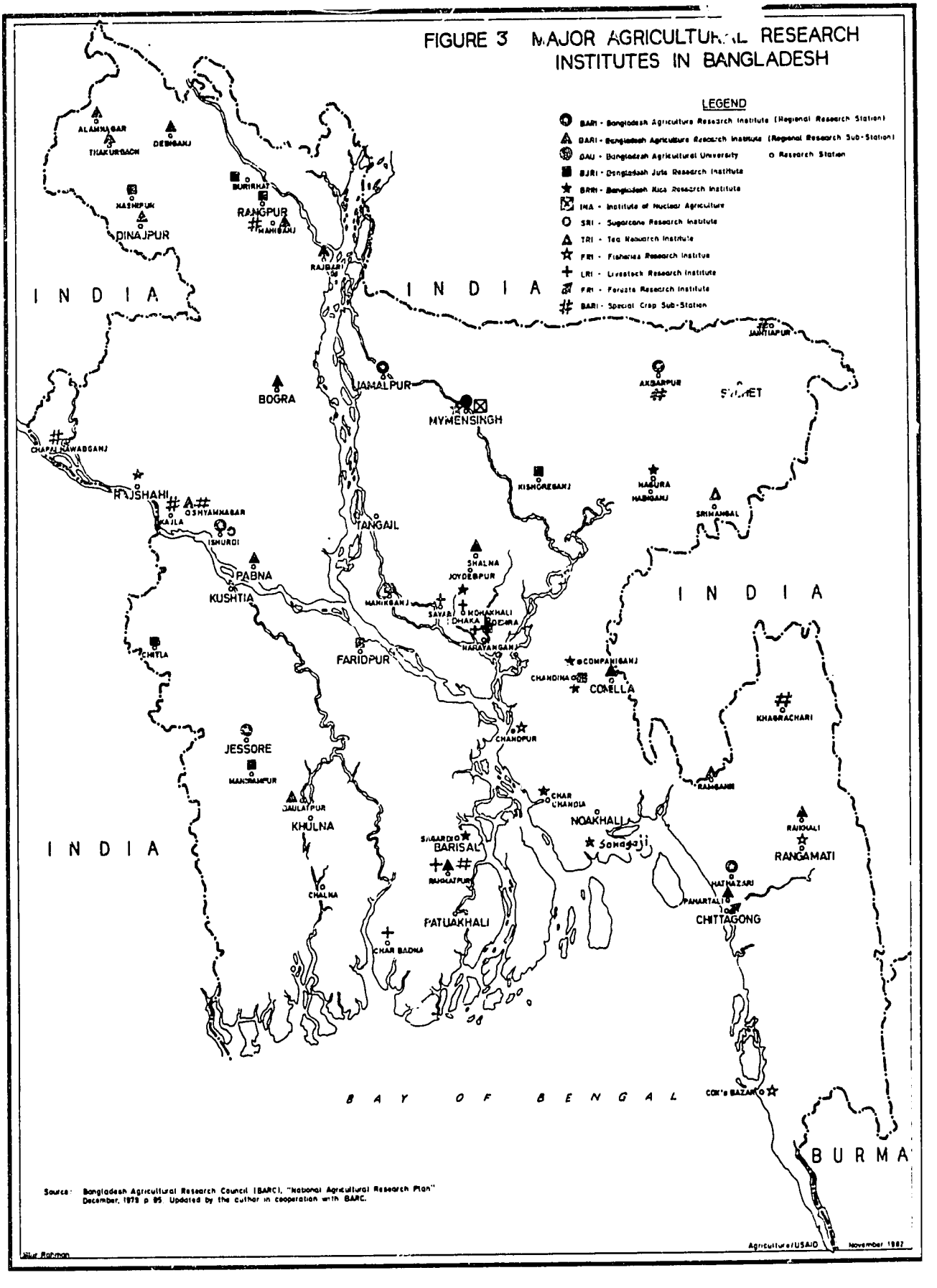


FIGURE 3 MAJOR AGRICULTURAL RESEARCH INSTITUTES IN BANGLADESH
LEGEND
BARI - Bangladesh Agriculture Research Institute (Regional Research Station)
BARI - Bangladesh Agriculture Research Institute (Regional Research Sub-Station)
BAU - Bangladesh Agricultural University
O Research Station
BJRI - Bangladesh Jute Research Institute
BRRI - Bangladesh Rice Research Institute
INA - Institute of Nuclear Agriculture
SRI - Sugarcane Research Institute
TRI - Tea Research Institute
FRI - Fisheries Research Institute
LRI - Livestock Research Institute
FRI - Forestry Research Institute
BARI - Special Crop Sub-Station
INDIA
INDIA
INDIA
INDIA
INDIA
BURMA
BAY OF BENGAL
ALAMNAGAR
THAKURGACH
DEBIGANJ
NASHIPUR
DINAJPUR
BURIRHAT
RANGPUR
MAHIGANJ
RAJBARI
JAMALPUR
BOGRA
MYMENSINGH
AKSARPUR
SYLHET
JAINTIAPUR
CHAPAI NAWABGANJ
RAJSHAHI
SHYAMNAGAR
KAILA
ISHURDI
TANGAIL
KISHOREGANJ
HABIGANJ
SRIMANGAL
PABNA
KUSHTIA
SHALNA
JOYDEBPUR
MANIKGANJ
SAVAR
MOHAKHALI
DHAKA
NARAYANGANJ
CHITLA
FARIDPUR
COMPANIGANJ
CHANDINA
COMILLA
KHAGRACHARI
CHANDPUR
JESSORE
MANSHAMPUR
DAULATPUR
KHULNA
CHAR CHANDIA
NOAKHALI
RANGAMATI
SHAGARDI
BARISAL
RAJAPUR
CHALNA
HATHAZARI
PAHARTALI
CHITTAGONG
PATUAKHALI
CHAR BADNA
COX'S BAZAR
Source: Bangladesh Agricultural Research Council (BARC), "National Agricultural Research Plan" December, 1978 p 95. Updated by the author in cooperation with BARC.
Agriculture/USAID
November 1982

nationals both overseas and in-country. BARC offers some fellowships and domestic sabbaticals for Ph.D. and M.Sc. degree programs. The council has established linkages with international research centers and assists in sponsoring local workshops, seminars, plus study tours abroad using international research resources.

Bangladesh Agricultural Research Institute (BARI).[25] Among the agricultural research institutes, BARI is the largest and most diversified (Table 8.8). BARI became a semiautonomous research institute in 1976 with responsibility for crops not under the jurisdiction of the several monocrop institutes. It has three major components: (a) a research section which consists of nine technical divisions, four laboratories, four regional research stations, and fifteen substations; (b) a graduate and post-graduate agricultural training program which offers instruction to about 500 students annually with an output of about eight graduates per year; and (c) an extension education and on-farm trial unit which is responsible for all off-station experimentation which uses about 200 farmer locations annually. Unlike other agricultural research institutes, BARI is a multiple-crop entity which conducts research only on crops not studied by the monocrop stations. Among the cereals, wheat, corn, sorghum, and millet are included. Additionally a wide variety of crops such as oilseeds, pulses, fruit, vegetables, potatoes, and spices are part of the core research program. The full range of genetic improvement work plus fertilizer response; management practices; insect rodent, and disease control; and water management practices are incorporated into the research program. In 1980, 600 scientists worked at Bari, which included 15 with Ph.D. degrees and 525 with the Master of Science (Table 8.9). BARI employs about 48 percent of all technicians at the nine major research institutes. During this same year, forty-seven professional publications were authored by BARI scientists.

Besides the extensive research program, BARI scientists conduct workshops and seminars. The physical facilities at the Joydebpur location are adequate for the research program. In contrast, on its nineteen regional and subregional stations, laboratories and equipment, housing, and machinery are judged inadequate or nil in about 60 percent of the cases (Table 8.8).

Bangladesh Rice Research Institute (BRRI).[26] The Rice Research Institute was established in 1970 as an autonomous institute. Its total mandate is rice. BRRI has fifteen research divisions which encompass all of the traditional subject matter of agriculture plus one on rice cropping systems. The institute also has five regional stations. Special interest in multidisciplinary research is professed, but no sociologist or anthropologist is on the faculty. BRRI conducts an ambitious research effort which covers most of the usual agronomic problem

TABLE 8.8
Major Agricultural Research Institutes and Substations in Bangladesh, 1982

Institute	Research Focus	Total Area (acres)	Manpower		Physical Facilities				
			Science	Total	Office	Labor Housing	Storage	Machinery	Technicians House
BARI									
1. Ishurdi (Pab)[a]	Multicrop for northwest	150	28	53	A	M	M	M	A
2. Jamalpur[a]	Wheat, maize, pulses, oilseeds, vegetables	213	20	60	A	M	A	M	M
3. Hathazari (Ctg.)[a]	Field crops, fruits	143	11	87	A	M	M	M	M
4. Jessore[a]	Field crops, cropping system	75	13	45	M	M	M	M	A
5. Akbarpur (Syl.)[b]	Fruits, vegs. for northeast	100	5	15	--	--	--	--	--
6. Debiganj (Din.)	Wheat, maize, pulses, vegetables	240	3	26	M	IA	M	M	IA
7. Rajbari (Din.)	Wheat, maize, pulses, oilseeds, vegetables	27	3	12	IA	IA	IA	IA	IA
8. Thakurgaon (Din.)	Multicrop	25	5	6	IA	M	M	M	M
9. Mohiganj (Ran)	Cotton	23	3	15	IA	IA	IA	IA	IA
10. Burirhat (Ran)[b]	Tobacco, wheat, maize, potatoes	72	6	31	IA	IA	IA	IA	IA
11. Alamnagar (Ran)[b]	Multicrop	20	3	6	IA	M	M	M	A
12. Bogra	Multicrop	30	5	25	M	M	M	M	A
13. Shyampur (Raj.)	Multicrop	32	3	10	M	M	M	M	M
14. Kazla (Raj.)	Mango, fruits	63	3	18	IA	N	IA	IA	IA
15. Pabna	Multicrop/outreach	20	1	7	IA	N	IA	IA	IA
16. Rahamatpur (Bar.)[b]	Coconuts	135	5	30	IA	N	IA	IA	IA
17. Pahartoli (Ctg.)[b]	Root crops, fruits, potatoes	36	2	12	M	N	IA	M	IA
18. Ramgarh (Ctg.)[b]	Hill farming, plantation	203	2	27	IA	IA	IA	IA	IA
19. Raikhali (Ctg.)	Wheat, pulses, oilseeds, maize, fruits	92	2	17	IA	N	N	IA	IA
BRRI									
20. Champak Nagar	Cropping systems	72	8	35	M	A	IA	M	M
21. Shyampur (Raj.)	Pest mgmt., rice cropping systems	28	8	30	M	A	IA	IA	M
22. Nagura (Syl.)	Deep water rice	92	8	32	M	IA	M	IA	M
23. Char-Chandina (Noa)	Saline-resistant rice	100	8	34	M	A	IA	IA	M
24. Sagardi (Bar.)	Tidal submergence-resistant rice	20	8	7	IA	N	IA	IA	IA
BJRI									
25. Manikganj (Duk.)	Breeding, cultural practices, cropping systems	100	14	32	A	A	M	A	A
26. Chandina (Com.)	Prereleased jute varieties	27	2	19	A	A	M	A	A
27. Kishorganj	Agroecon. & jute cropping systems	47	2	20	A	A	M	A	A
28. Faridpur	Jute varietal selection	35	2	18	A	M	M	A	M
29. Rangpur	Varietal trials, agroecon. studies	47	2	19	A	N	N	A	M
30. Tarabo (Dak.)	Jute seed multiplication	13	1	12	A	N	N	A	A
31. Monirampur (Jes.)	Jute seed multiplication	21	1	14	A	N	N	A	A
32. Chitla (Kus.)	Production foundation seeding	400	31	48	A	N	N	A	A
33. Nasirpur (Din.)	Prod. & distrib. foundation seeds	781	51	79	A	N	N	A	A

BTRI									
34. Srimangal (Syl.)	Plucking, fert., hybridization, pests, & diseases	564	31	112	A	A	A	M	M
SRTI									
35. Ishurdi (Pab.)	Breeding, agron., soils, entom., path., chem., & physiology	235	50	62	A	A	A	M	M
INA									
36. Mymensingh	Plant breding, soil/plant relat., water mgmt., pest mgmt., nuclear technology	42	80	148	A	A	M	M	M
DLS									
37. Mohakhali (Dak.)	Animal nutrition, art. insemination, diseases vaccine prod.	6.42	71	272	M	A	M	M	IA
38. Comilla	Vaccine prod., animal breeding	6.59	26	109	A	A	N	M	N
39. Dhaka	Veterinary research	3.5	8	30	A	A	N	M	N
40. Savar (Dak.)	Breeding, fodder production	200	30	40	A	A	A	A	A
FTR									
41. Chandpur (Com.)	River, stuarine fisheries	43	40	300	A	A	A	A	A
Chandpur (Com.)	Processing, by-products	43	20	NA	A	A	A	A	A
Chandpur (Com.)	Training	43	16	NA	A	A	A	A	A
42. Rangamati	Kaptai Lake management	NA	NA	NA	IA	IA	IA	IA	IA
43. Mymensingh	Fishculture, nutr., induced spawning physiology, biology	100	30	NA	A	A	A	A	A
44. Cox's Bazar	Marine fisheries, oceanography	8	1	50	M	N	M	M	N
FRI									
45. Shalashahar (Ctg.)	Tree growth, maturity, ind. use	70	160	800	M	M	M	M	M
46. Ukhia (C.B.)	Seed production	74	--	--	M	M	M	M	M
47. Dulahazara (Ctg.)	Seed production	83	Information on manpower and physical facilities from numbers 47 through 62 are not available.						
48. Heakon (Ctg.)	Seed production	105							
49. Ichamoti (Ctg.)	Seed production	108							
50. Kaptai (Ctg.)	Seed production	84							
51. Baghirhat (Ctg.)	Seed production	10							
52. Barshijura (Syl.)	Seed production	132							
53. Salna (Dak.)	Seed production	10							
54. Keochia (Ctg.)	Silviculture	1041							
55. Chandina (C.B.)	Silviculture	41							
56. Charkai (Din.)	Silviculture	198							
57. Charaljani (Tan)	Silviculture	450							
58. Hathazari (Ctg.)	Silviculture	65							
59. Hazarikhil (Ctg.)	Silviculture	70							
60. Lawachara (Syl.)	Silviculture	220							
61. Mazoni (Khu.)	Mango	1							
62. Bogi (Khu.)	Mango	39							

Sources: Personal interviews with officials of BARC.

A = adequate. IA = inadequate. M = moderate. N = nil. NA = not available.

[a]Regional stations to serve the need of that region. [b]Special crop research station.

TABLE 8.9
Existing Scientific Manpower and Projected Requirements for the Second Five-Year Plan Period, Bangladesh, 1980

Institute	Ph.D.		M.Sc. (Ag.)		B.Sc. (Ag.)		Total		% Increase Over Existing
	Existing	Needed	Existing	Needed	Existing	Needed	Existing	Needed	
BARI	15	90	525	55	60	55	600	200	33
BRRI	23	18	105	84	3	8	131	110	84
BJRI	8	15	125	50	28	12	161	77	48
FRI	6	15	68	30	24	1	98	46	47
INA	7	5	42	12	18	--	67	17	25
TRI	1	17	20	36	9	3	30	56	187
SRI	4	11	12	33	4	--	20	44	225
Fisheries	--	10	15	15	21	12	36	37	103
LRC	2	15	21	35	74	10	97	60	62
Total	66	196	933	350	241	101	1240	647	52
BAU	78	158	185	118	11	10	274	286	104

Source: BARC, **National Agricultural Research Plan**, December 1979.

areas and concerns, i.e., plant breeding, plant physiology, soil chemistry, and entomology. The research program is designed to consider problems associated with specific agroclimatological zones so each of the five substations is located in a unique rice producing area. In 1980, BRRI employed 131 scientists, of which 23 held Ph.D. degrees and 105 had Master of Science training (Table 8.9).

The physical facilities at the five substations do not match the adequacy of those at the central station in Joydebpur (Table 8.8). Laboratories are considered adequate at only two stations and laboratory equipment is judged inadequate at all five. Office facilities, housing, and station equipment are moderate to inadequate at three stations. Overall, the physical plant at most substations is insufficient for quality research, which makes it difficult to attract quality scientists to live and work in the rural areas.

The governing board of BRRI is chaired by the Minister of Agriculture and includes the secretaries from agriculture, planning and finance, and the chairmen of both BADC and BARI. Of special interest is the membership of the Director General of the International Rice Research Institute (IRRI) in the Philippines. His presence insures a continuing contact with the international centers and an input which improves the relevance of research planning and implementation.

Bangladesh Jute Research Institute (BJRI).[27] The Jute Research Institute was created in 1973 to provide a research base for the important jute industry. The institute has six research stations, the central facility at Dhaka, two seed farms, and twenty-four subcenters located in the various jute producing regions.

There are seven research divisions, i.e., botany, agronomy, soil science, plant pathology, entomology, microbiology and biochemistry, and statistics. The research program includes the broad agronomic elements found at the other monocrop institutes. Attention is placed on variety testing for high yields and fiber quality, as well as tolerance to drought, water logging, and salinity. Special attention is being given to the problems associated with white jute which represents the majority of production in Bangladesh. Its quality and price are lower than other varieties and this type is also more susceptible than some other varieties to the vagaries of nature. Additionally, the research program covers a wide range of traditional research consistent with the focuses of the research divisions.

The institute maintains an outreach program for disseminating information directly to jute producers. Scientists from BJRI participate directly as field advisors. Also, the institute provides in-service training in jute cultivation to extension workers.

The professional staff of the BJRI is second in number only to BARI. In 1980, 161 scientists were employed at the institute. Only 8 held Ph.D. degrees while 125 had Master of Science degrees (Table 8.9). Unlike many of the other research facilities, those of the BJRI are generally considered adequate, excepting the Rangpur station (Table 8.8). Even the seed farms have adequate facilities except for the laboratory facilities.

Forestry Research Institute (FRI). The institute is under the jurisdiction of the MOA and has its major research center in Chittagong. There are seven additional stations spread throughout the country in the forested regions of Chittagong, Sylhet, Khulna, Tangail, and Dinajpur. In addition, the institute operates nine seed nurseries which provide seedlings for plantations (Table 8.8). In 1980, the staff consisted of ninety-eight scientists of which six had Ph.D. degrees and sixty-eight Masters of Science (Table 8.9). The research is broadly divided into two categories: (1) forest management which deals with forest growth and production of primary wood products; and (2) forest products research which encompasses the technology of processed wood products. Within these general categories, the research program focuses on a wide range of production, management, disease, and related issues. Major national concerns over reforestation and the management of the Sundarbans forest are reflected in the research strategy of the institute. Additionally, forest based industries and wildlife protection and management are important elements of the program.

Tea Research Institute (TRI).[28] The Tea Research Institute is the scientific arm of the Bangladesh Tea Board. The institute has six technical divisions. There are three substations associated with the main research establishment at Srimangal, Sylhet. The research program services about 100,000 acres under tea production on approximately 150 tea estates. Most of the estates are privately owned. The staff of the institute in 1980 was composed of thirty scientists of which twenty had Master degrees and only one had a Ph.D. (Table 8.9). The program encompasses a fairly broad and traditional scope of agronomic research, i.e., fertilizer response, disease control, and management practices. Additionally, the introduction and selection of high yielding vegetative clones and seed lots and the rehabilitation of older soils occupy a significant effort. A major activity of the institute is the extension type, advisory service provided to the tea estates which includes short courses plus visits to the estates. The institute also maintains nurseries at its various research facilities where clonal plants and rooted and fresh cuttings are produced for distribution to the tea estates. The physical facilities at the research stations are considered adequate, including an experimental tea factory which became operative in late 1978 (Table 8.8).

Directorate of Livestock Services (DLS). The livestock research program is part of a general services directorate under the MOA. The directorate has an extensive infrastructure to carry out its program. In addition to the Livestock Research Institute at Dhaka, the total program includes an animal husbandry facility at Comilla, one for veterinary research at Dhaka, a cattle breeding station at Savar, and a poultry breeding farm near Dhaka (Table 8.8). Non-research facilities for duck and pig breeding are maintained in Chittagong.[29] The scientific staff includes ninety-seven people of which twenty-one hold Master's degrees and two are Ph.Ds (Table 8.9).

The livestock research programs have been highly fragmented and provide no significant information for the livestock industry. Most of the effort has been given to improved breeding stock. Priority areas such as draft animal power and utilization of farm by-products have not been effectively addressed. The facilities for traditional types of livestock research are inadequate. Corrals, laboratories, herd sizes and composition, among other factors, are not sufficient for conducting quality research. Furthermore, the national planning process and the research direction given to animal research are deficient. Priority needs have not yet been addressed.[30]

Fisheries Technological Research (FTR). The fisheries research capability is located at the center in Chandpur, which is part of the Directorate of Fisheries of the MOA. This center, plus the freshwater fisheries station at Comilla and the College of Fisheries at the BAU are the principal centers of fishery research competence in Bangladesh. The other four fishery-related units under the directorate include two training centers, a fish inspection and quality control laboratory, and a marine biological laboratory and aquarium (Table 8.8). The scientific manpower employed in the fisheries program totaled thirty-six professionals in 1980. None held a doctorate and fifteen had masters degrees (Table 8.9). The formal fisheries research conducted to date is very limited and of marginal quality. Most of the fishery activities of the directorate and its subunits have dealt with training, administration of relevant fisheries ordinances, licensing, and developmental schemes to increase production and reclaim ponds. A major World Bank project covers 215 square miles in Chandpur and the development of 28,000 ponds.[31] Essentially no research has yet been directed to the basic issues associated with utilizing the four million acres of perennial inland waters and the seven million acres of surface water estimated to be available seasonally in low-lying areas.

Institute of Nuclear Agriculture (INA). The INA is one of several such facilities established around the world under the sponsorship of the International Atomic Energy Agency of the United Nations. INA was organized in its current form in 1972.

It was moved to its present site in 1975 where facilities were provided under a grant from SIDA (Sweden) (Table 8.8). Previously, application of radioisotopes and ionizing radiation in agriculture had began as early as 1961 in East Pakistan at the Atomic Energy Agricultural Research Center. The institute covers about thirty-six acres of modern buildings and demonstration plots on the campus of the BAU.

The institute has given emphasis to mutation breeding of new crop varieties and the efficiency of fertilizer use. Crop focus has been on cereals, fibers, legumes, and oilseed crops. The research programs are organized around problems and not disciplines. Development of early maturing varieties of rice has been a major research effort. Another has been the classificaton of soils in Bangladesh for both micro and macro elements.

The faculty at INA in 1980 consisted of sixty-seven professionals of which seven were Ph.Ds and forty-two held Master's degrees (Table 8.9). However, the project envisioned a professional staff of 122. The manpower situation at INA has been a problem almost from its inception. Salary schedules are lower than in MOA and advancement possibilities less attractive. INA personnel have also experienced difficulty in securing opportunities for higher degrees which are prerequisites for advancement. Of no small consequence, also, is the inferior recognition given INA work by other major agricultural institutes.[32] Overall, the institute has not achieved its initial promise.

Sugarcane Research and Training Institute (SRTI). The sugar institute was established in 1951 to service the research needs of the sugarcane industry. It operates under the jurisdiction of the Ministry of Industries and Commerce. The institute has research divisions of plant breeding, agronomy and soils, plant physiology and nutrition, pathology, agricultural economics, and entomology. In 1980, the institute expanded its outreach activities by establishing a Training and Communications Division to better communicate research findings to producers and to provide training in sugar production methods at all levels from sugar factory supervisors to growers. Both extension and in-service training are part of the program. Since 1978, the SRTI has received direct technical assistance from the government of Australia to upgrade the program, improve materials, and help train personnel. Likewise, the Japanese Overseas Cooperation Volunteers (JOCV) have provided assistance, particularly in intercropping experiments, from 1979-81.[33]

Program facilities are located only at Ishurdi (Table 8.8). There are no other substations. The professional staff totals about twenty scientists of which four hold Ph.Ds and twelve have Master of Science degrees (Table 8.9).

The institute conducts a fairly broad and traditional agronomic research program within the subject matter represented

by the six divisions. There is no discernible special focus of research. The impetus given by the Japanese assistance in cropping systems has been accorded some prominence and seems appropriate given the high potential for intercropping associated withsugarcane production.

Financial Support for Agricultural Research

Agricultural research receives considerable funding from the BDG. Only in cases of sugar and tea are funds generated via a product assessment network. All sugar production is assessed at Tk. 2.50 per maund and tea at 1 percent of auction value to support research.[34] In 1980, the total budget for agricultural research was Tk. 380 million or about $19 million (Table 8.10). A majority of the funds (61 percent) were from domestic sources and the remainder from foreign assistance. Capital expenditures comprised 78 percent of the total in 1980 and have been dominant each year since 1976.

The trends in budgetary support since 1976 have been impressive. Total research funding has risen at a compound rate of 38.5 percent annually. Domestic support also has increased slightly in excess of 35 percent annually. In general, the trends have been steadily upward. The only interruption was between 1976 and 1977 when foreign assistance fell by about 50 percent, but even then domestic support for research rose by 20 percent. However, since 1977, foreign assistance has multiplied about sevenfold. The pattern of support has been about the same in real prices. The increase in real total support has been 23.5 percent per annum since 1976.

Donor assistance to agricultural research comes from several nations and agencies. The World Bank has supported infrastructural development and given assistance for a BARC contract research program. IDA has approved a 1982 project in agricultural research and extension totalling $23.2 million. Australia has backstopped BRRI as well as giving assistance to the SRI and the Savar dairy farm. The Ford Foundation also has assisted BRRI as well as water management research efforts at BAU and BARI. The USAID program has featured farming systems research coordinated through several local institutions under the direction of BARC. Much of this total assistance by donors provides for physical facility development, training, or involves expatriate scientists assigned in Bangladesh to assist a specific research focus. Very little donor assistance is given for meeting recurrent operating expenses of the research system.

Despite the favorable increases in funding, the level of support appears insufficient to underwrite the quality research structure that is needed for a progressive agriculture sector. In 1980, the total support amounted to 0.24 percent of the nation's GDP and only 0.40 percent of the agricultural GDP. In both cases, this represented slightly more than a doubling since

TABLE 8.10
Agricultural Research Funding and Personnel, Bangladesh, 1976-80[a] (million taka)

	Fiscal Year					Compound Growth[b] (%)
	1976	1977	1978	1979	1980	
Total Agricultural Research (current prices)	**103.5**	**99.8**	**164.5**	**192.6**	**379.9**	**38.5**
Domestic sources	63.9	78.7	97.7	125.4	233.5	35.8
Foreign assistance	39.6	21.1	66.8	67.2	146.4	45.8
Capital	83.1	73.3	131.0	146.5	296.9	38.3
Recurring	20.4	26.5	33.5	46.1	83.0	39.9
Total Agricultural Research (constant 1975-76 prices)	**103.5**	**89.7**	**131.7**	**134.9**	**242.0**	**23.5**
Domestic sources	63.9	70.7	78.2	87.9	148.7	21.0
Foreign assistance	39.6	19.0	53.5	47.1	93.3	30.0
Capital	83.1	65.9	104.9	102.6	189.1	23.2
Recurring	20.4	23.8	26.8	32.3	52.9	24.8
Total Agricultural Research (current prices):[c]						
As % of GDP	0.10	0.09	0.13	0.14	0.24	
As % of ag. GDP	0.18	0.19	0.23	0.25	0.40	
As % of ag. budget[d]	3.35	3.07	4.54	3.98	5.56	
Scientists Engaged in Agriculture:						
Total	943	984	1234	1281	1302	
National	921	952	1190	1230	1256	
Expatriate	22	32	44	51	46	
Budget/Scientist (National) (taka 1000)	**112**	**105**	**133**	**157**	**302**	

Source: Gerard J. Gill, **Operational Funding Constraints on Agricultural Research in Bangladesh**, Bangladesh Agricultural Research Council, Report No. 9, April 1981, p. 4.

[a]Fiscal years (July 1 through June 30). These data were compiled from the Revised Annual Development Programs for the years in question (finance) and from the various research institutes (personnel). Inflation rates to calculate constant prices came from IBRD (1980) and recent reports.
[b]Calculated by least-squares trend line.
[c]Calculated by author using GDP and agricultural GDP figures in Table 1.1.
[d]Agricultural budget calculated from recurrent and ADP budgets in Tables 5.1 and 5.5.

1976. But here, as with the other trends, the beginning base was low and the growth is misleading as an indicator of the adequacy of research support. Even within the agricultural budget itself, the share of research in 1980 represented only 5.5 percent of the ADP for agriculture.

Among the eight major research institutes, BARI expended almost 60 percent of the 1980 funds (Table 8.11). BRRI had the next largest program, which, combined with BARI, amounted to 77 percent of the total expenditures by the group. The expenditures by SRI for sugarcane research were surprisingly high given the relative unimportance of the crop, especially in comparison to a crop like jute which plays such a major role in the export earnings. The level of support to sugar research, however, reflects the revenues resulting from the research assessment on sugar production. The annual growth rate in expenditures of the

TABLE 8.11
Expenditures by Major Agricultural Research Institutes, Bangladesh, 1976-80

Institute	Date Estab.	Fiscal Year 1976	1977	1978	1979	1980	Compound Annual Growth[a]
		----------(million taka)----------					(%)
BARC	1973	1.48	2.62	2.08	4.99	1.06	(-0.2)
BARI	1909	NA	24.11	41.96	77.15	129.23	75.9
BJRI	1950	3.47	6.80	9.14	10.21	10.99	31.2
BRRI	1970	17.55	24.26	22.27	28.33	39.87	19.7
FRI	1954	4.86	8.58	11.24	12.20	15.19	30.1
INA	1972	9.44	8.01	4.38	8.49	3.40	(-18.0)
SRI	1973	3.38	2.80	3.69	10.33	13.59	50.5
TRI	1957	4.30	3.37	4.54	6.02	5.11	9.7
Total		44.48	80.55	99.30	157.72	218.44	47.0

Sources: Gerard J. Gill, **Operational Funding Constraints on Agricultural Research in Bangladesh,** Bangladesh Agricultural Research Council, Report No. 9, April 1981, pp. 9-11; and M. Alauddin, "Agricultural Research Organization and Policy in Bangladesh," **The Bangladesh Journal of Agricultural Economics** IV(December 1981).

eight major institutes since 1976 was 47 percent. BARI (75.9 percent) and SRI (50.5 percent) had the highest annual growth during the period. The growth of BARI expenditures was, in part, the result of the high capital investment to develop the research complex at Joydebpur. INA was the only program to show a major decline in expenditures, indicative of both a shift in priorities for research programming and a decline in capital investments. BARC's growth was slightly negative. BARI and BRRI stood at the top of the expenditure list, but the annual expenditures by BRRI grew at a lower rate than most other crops. Sugar, forestry, and jute research all had annual growth rates higher than for rice during the period. However, expenditures for jute research were the third lowest among the group and were exceeded by both forestry and sugar.

The comparisons are equally revealing when made on the basis of expenditure per scientist assigned to each research institute in 1980 (Table 8.12). The same trends exist whether total, recurrent, or operational expenditures are used. BRRI and BARI

TABLE 8.12
Research Expenditures per Scientist by Expenditure Category,[a] 1980 and 1976-80 (average)
(in dollars)

	1980			1976-80 (Average)		
Institute	Total Expenditures	Recurrent Expenditures	Operational Expenditures	Total Expenditures	Recurrent Expenditures	Operational Expenditures
BARI	13896	5164	3866	5866	2306	622
BRRI	19637	9834	5906	13029	5045	736
BJRI	4404	2117	290	3255	1257	217
FRI	10002	4543	1684	6856	3056	1080
INA	3849	3685	NA	6610	3398	NA
SRI	43845	10229	6083	21780	6999	4274
TRI	10989	9466	6658	10034	6340	4210
Average	**12704**	**5628**	**2685**	**6864**	**2804**	**780**

Source: Gerard J. Gill, **Operational Funding Constraints on Agricultural Research in Bangladesh**, Bangladesh Agricultural Research Council, Report No. 9, April 1981, pp. 9-11.

NA = data not available.

[a]Calculated by using number of scientists in each research institute from Table 8.9. Rate of exchange = taka 15.5 = U.S.$1.

are both relatively high, but the total expenditure per scientist in sugar research was more than double that of BRRI and triple that found for BARI. Forestry and tea both had more than double the expenditure per scientist compared to jute research. Only INA had less expenditure per scientist than BJRI.

Perhaps the more meaningful comparisons are those based on the level of operational expenditures per scientist since these funds represent the resource commitments for accomplishing the annual research programs. Once basic capital investments are made, it is the operational funds which have the greatest impact on program progress. In 1980, scientists had an average of $2,685 available for operations. Tea, sugar, and rice researchers had significantly more than those in the other institutes. Jute expenditures were extremely low. The level of operational support for all institutes was considerably improved in 1980 by comparison with the average for the period 1976-80. The average operational expenditure for the five-year period was only $780 for the seven research facilities. BRRI had the largest improvement as the 1980 operational support was about $5,100 per scientist higher than the average for the period. Most of the other differentials were in the area of $2,000 with the exception of jute and forestry which continued to receive minimal support.

There are no totally acceptable comparative data by which to judge the adequacy of the research support, but there are two points which are indicative. First, the improvement in operational funds in 1980 are encouraging as are the overall trends in research support since 1976. Yet, the average expenditure of $12,704 per scientist is likely below the necessary norm. If we compare this expenditure with that of Japan, even as far back as 1972, the differences are significant. In that year, Japan had 17,564 scientists working in all fields of agricultural research at an average expenditure per scientist of about $20,000.[35] If measured in 1982 dollar equivalents, the Japanese expenditures would be considerably higher.

There are obvious inequalities in comparing the two nations on this basis, but the disparity in research support is much greater than even very liberal appraisals might reasonably accept. The disparity is even more meaningful when viewed in terms of the basic role played by agricultural research in modernizing Japanese agriculture. Overall, Bangladesh does not come close to this level of commitment to agricultural research despite the fact that its needs are equally as great as those faced earlier by Japan, and its development constraints are similar.

The second measure of the adequacy of research support is expressed by a qualitative appraisal of the effectiveness of the research system. In general, the research system shows symptoms of insufficient operating funds. Daily operating budgets are administered as a residual to such fixed obligations as salaries

and capital improvements and, as such, bear the full impact of decreases or shortfalls in day-to-day budgeting. Scientists and facilities are rendered inoperative and programs curtailed due to deficient operating budgets and inflexibility in allocations. Stringent budgets have also led to excessive administrative controls and centralized authority which has taken much of the decision making from decentralized research units and project directors. The internal disbursement process is cumbersome, resulting in detrimental delays in transfer of funds between the Ministry of Finance and the operating agencies. More often than not, disbursements to line agencies are in arrears by as much as three to six months.[36]

The nature of the problem can be more clearly illustrated by brief resumes of some case examples reported by Gill:[37]

Case 1: Land available to the plant breeding division of BARI layed idle for lack of funds to pay for plowing and land preparation.

Case 2: A study of the economics of maize, wheat, potatoes, and sweet potatoes was postponed until outside support of $2,000 could be secured for temporary staff, fuel, and publication costs. BARI did not have the funds, but Ford Foundation supplied them.

Case 3: Annual maintenance and operation costs ($6,250) for a newly constructed greenhouse complex at BJRI were not available in the budget.

Case 4: Transport needs for fieldmen to service on-farm research sites could not be met by BARI. Only ninety-seven motorcycles were available for 221 fieldmen and five vehicles for fifty-nine scientists. Use was further restricted by lack of fuel and maintenance for the existing vehicles.

These are merely examples from a much more extensive list of inadequacies which curtail the overall effectiveness of the system. Funding levels for recurrent and operational costs are too low to allow the level of uninterrupted programming which characterizes a high quality research system.

Effectiveness of the Research System

Beyond sheer numbers of technical personnel and the adequacy of research support, a major issue is the effectiveness of the research complex. This is best reflected by the commitment of the scientific staff and the quality and relevance of the system's informational output. Both involve intangibles which make quantitative measures difficult. Generally, evidence of research activity is not necessarily synonymous with quality research. Likewise, scientists who engage consistently in repetitive and rote research are not necessarily engaged in

quality research. Yet, such is frequently the case in developing nations where the tendency is to view research as a job which is completed with the passage of the required hours of work each day. Unfortunately, significant amounts of scarce resources are invested in this type of inconsequential effort which generates limited payoff to the nation's agriculture. Quality agricultural research challenges the contraints to agricultural production in such a way as to answer the issues of most relevance to the sector. Thus, the effectiveness of the system is better measured by the quality of its output as evidenced in the trends in new technological availability than by expressions of activity or voluminous annual progress reports.

By this criteria, the effectiveness of the Bangladesh agricultural research system can be described as promising. The system is still very much in evolution, and some of the conditions and attitudes described above are present. It has faced difficult years of infrastructural development and assemblage of technical staff. Research output has a tendency to feed on itself as one piece of important research information leads to new investigations. Time and maturity are important ingredients in the success quotient.

Still, the system has delivered some meaningful successes. Bangladesh scientists have developed five new rice varieties which compete with IR-8 in boro production and which have replaced, to a significant degree, the IRRI varieties previously used in Bangladesh. Likewise, one aus variety and three transplanted aman varieties are making similar inroads in replacing traditional varieties. The new introductions are not dramatic improvements in yield, but they do possess improved resistance to disease and drought which brings greater stability to the genetic stock. On the horizon, six lines of broadcast aman reportedly have potential to fill the gap where no HYVs currently exist.

The dramatic increase in wheat production has been fed by two Bangladeshi varieties, Balaka and Doel which were released in 1979. Likewise, the expansion in mustard production has benefited from the introduction of two improved varieties, SS-75 and TS-72, developed by Bangladeshi scientists. Soya has been initially introduced with two HYVs based on domestic work. Farmer adoption has been limited (400 acres), but all are in HYVs. Likewise sesame and groundnuts now have locally developed HYVs available. BARI's recently released summer pulse varieties, HYV mung beans, and black grams are gaining wide acceptance due, in large part, to the shorter maturity (fifty-five to sixty-five days) which is about one-half the time needed for winter pulse varieties. The resurgence of potato production in Bangladesh can be traced to Holland varietal introductions which were selected by BARI scientists. Additionally, the nuclear research at INA has released early maturing, higher yielding rice, chickpea, and jute mutants. In the area of cultural practices, the institute

has demonstrated that irrigation is unnecessary for wheat production in the Brahmaputra flood plain soils and that rock phosphate can be substituted for superphosphate in acidic soils.[38]

These examples represent some of the major accomplishments of the young research system and give cause for a cautious optimism for the future. Still, there are inadequacies in the system which require attention. First, the advance of the overall system has not been uniform. Most of the best output has come from two institutes, BARI and BRRI. The remainder of the system has faltered. There are obvious variations in performance within the system and a recent evaluation rated the achievements of the research complex as irregular and those of individual stations from good to very poor and to essentially non-productive.[39] The stations were not identified individually. The research output for livestock, fisheries, and forestry are especially deficient. Research on tea and sugar show improvement but is still lagging. The output of jute research is perhaps the most disappointing, given the desperate need for significant new techologies to combat the pressures of competition in world export markets.

Secondly, all disciplines within the research system have not contributed adequately to the information flow. Genetic research appears to have received much more emphasis than agronomic and, for that matter, social research. This has happened despite the probability that varietal advances may have plateaued for several crops and that dramatic yield increases are less likely than with improvement in some management and cultural practices. This is not an argument for excluding genetic research but rather one for a more balanced research effort. Bangladeshi farmers are in need of information on water response, soil fertility, weeding practices, and other cultural practices. Of considerable importance now is information on crop rotation and farm resource organization which become feasible with the introduction of irrigation water. Very likely, new management possibilities hold the potential for dramatic increases in yield. Additionally, information on cultural practices can more adequately prepare farmers to exercise reasonable man-made control of the agricultural environment.

Unfortunately, natural vagaries still largely determine production outcomes in Bangladesh, even for normally controllable occurrences. The informational base to adequately curtail the deleterious effects of such hazards as drought, floods, pest infestations, diseases, or soil deficiencies, for example, is not widely available or adequate. Fertilizer and irrigation recommendations are not yet refined sufficiently to provide detailed area breakdowns with respect to amount, method, and timing of application. Within the total investigative milieu of the research system, the social sciences have not been adequately involved, particularly sociology and anthropology. (Economics is included in most major programs.) Finally, several other

shortcomings, which have been pointed out in prior evaluations of the research system, still persist. Inadequate research and living facilities at regional stations, the continuing problem of coordination and planning for the overall system, and the incentive and merit system for professional personnel are some of the more pressing issues that prevent the system from attaining its full potential.[40]

Notwithstanding, all of the research institutes report impressive programs both in quantity of activity and breadth of areas under investigation. Most programs cover the traditional research areas from plant breeding to diseases to soil fertility. What is still unclear is the extent to which these efforts represent a union of professionalism and science. It may be meaningful that some institutes do not publish or widely distribute their research results. In fact, annual research reports for many are published late by as much as a year or else are not published at all. The general mode for most experiment stations is delay in publishing what appear to be fairly routine research results.

The system, nevertheless, has significant promise. It is still young and evolving. The base of facilities and people are considerable relative to many LDCs. Some accomplishments to date can be seen as highly significant given the short gestation period the system has had and the interruptions to research projects caused by spotty financial support. The agricultural research system also can draw on the professional infrastructure which has evolved in Bangladesh. Numerous national professional organizations are active, many of them in disciplines associated with agricultural sciences. The magnitude of the activities can be judged by the ninety major scientific and technical periodicals which are published in Bangladesh. Publication frequencies range from weekly to annually. Of the total, thirty are directly related to agricultural topics, four deal with economic subject matter, thirteen are medical publications, twenty-four cover a wide range of scientific topics, and the remaining nineteen are on miscellaneous subjects.[41] The quality of the scientific journals was not assessed. But the mere presence of such a large number, plus the associated professional organizations, places Bangladesh far ahead of many LDCs in providing publication outlets and exposure to professional and peer review. This kind of professional orientation is fundamental to a quality research system. The research system, like the university, is an essential part of the scientific base which is necessary for a highly productive organization. Commitment to quality output by the scientific community associated with the sector is an incipient guarantee that agriculture will have the prerequisite scientific assistance for successful modernization.

International Research Linkages

Bangladesh maintains excellent contacts with several international research centers. BARC is the center for these contacts in its role as research coordinator. BRRI and BARI are the institutes most involved in the collaboration with international centers.

At least twenty-two international research groups have some type of program contact with Bangladesh. A large majority of their assistance supplements existing in-country programs for items such as research materials, travel grants for international meetings, study grants abroad, short-term experts, and library and informational services. Some programs involve bilateral cooperation such as the Indian Center for Agricultural Research (ICAR). Under this type of arrangement, Bangladesh and India provide reciprocal in-country assistance to technicians visiting each other's countries. In the case of the West African Rice Development Association (WARDA), Bangladesh has received scientists from several West African nations for training.

The major technical assistance programs are carried out by IRRI (for rice), the International Center for Improving Corn and Wheat (CIMMYT), the International Potato Center (CIP), and the International Crop Research Institute for Semi-Arid Tropics (ICRISAT). Several maintain resident representatives in Bangladesh. The Tropical Products Institute (TPI) from England has a limited but important study in postharvest losses in process. Also, Bangladesh receives considerable help from the International Fertilizer Development Center (IFDC). This work is not strictly research but is primarily market developmental assistance with the new product evaluation and market development for fertilizer.

The System of Agricultural Extension

Evolution of the extension system in Bangladesh has been, expectedly, allied with that of the research system. The pre-partition program of the British was greatly disrupted by the exit of expatriate technicians, and attempts to reinstate the program during the Pakistan period were unsuccessful. In 1970, the Directorate of Agricultural Extension and Management (DAEM) was established as a result of the bifarcation of the Directorate of Agriculture which had included agricultural extension, research, and education. The separation of the three functions was seen as a means of intensifying the extension effort.

The expectations for extension were blunted by the creation of large numbers of monocrop research and extension-related institutions following independence. The crop developmental boards such as for cotton, tobacco, and horticulture plus the

several directorates for plant protection, jute, and others, also were given outreach responsibilities. Justification for fragmentation of the extension function was founded in the specialized needs of the monocrop focus. Promotion of production, marketing, and processing were all argued to require personnel with specialized knowledge and skills. Thus, specialization was introduced despite the fact that, in most cases, the extension contacts were duplicated as each individual extension unit dealt with the same farmers.

The Organization and Structure of Agricultural Extension[42]

The fragmentation of the extension function has expanded to the point where about twenty separate institutions have mandates to provide extension services within the agricultural sector. Nonetheless, the DAEM is the largest of all extension-oriented institutions and is recognized as the National Extension Service (NES). The DAEM operates in geographical areas which encompass about 88 percent of the cropped area of Bangladesh and about 6.5 million farm units. Its organizational pattern follows the format of the nation's geopolitical subdivisions. The organizational focus translates into six levels of management in the extension network (Table 8.13). Reportedly, DAEM employs 50 percent of all extension personnel in Bangladesh.[43]

The national headquarters of the directorate is organized into five major sections: (1) agricultural extension; (2) agricultural education and training; (3) planning and evaluation; (4) budget and accounts; and (5) establishment. Programming within the DAEM breaks down into two general activities. First is the implementation of action programs and other special production-oriented efforts which arise from goals set in the national planning process. Closely correlated is the monitoring of national production and the preparation of crop estimates and forecasts. The second major activity is education and training. The DAEM operates a wide variety of training, pre-service, and in-service courses. It has administrative, academic, and operational control of the twelve AETI's and related extension programs. Farmer training activities are planned and supervised by the national directorate. In-service training of extension personnel is accomplished, in part, through cooperation with BARI, BRRI, and the graduate training institute at the BAU.

The union agricultural assistants (UAA) and the village extension agents (VEA) are the farmer contact points of the extension system. Organizationally, they report to the thana agricultural officer (TAO), although the extended scope of their responsibilities often places them under the jurisdiction of other thana level officers and technical experts who require assistance in specific projects. Extension personnel up to the TAO level normally have formal education in the AETIs (a diploma program two years beyond the tenth year of secondary study). In

TABLE 8.13
Personnel Profile of the Directorate of Agriculture, Extension, and Management, 1981

Extension Level	Number	Training Level[a]
1. National directors	17	Agricultural graduates
2. Regional directors	131	Agricultural graduates
3. District ag. officer (DAO) & District ext. officer (DEO)	63	Agricultural graduates
4. Subdivisional ag. officers (SDAO)	92	Agricultural graduates
5. Thana ag. officers (TAO) & Thana ext. officers (TEO)	900	Agricultural diploma
6. Union ag. assist. (UAA) & Village ext. agents (VEA)	7800[b]	Agricultural diploma

Sources: Department of Agriculture, Extension and Management, "Annual Report 1979-80" and "1980-81," undated; and USAID, **Project Paper: Agricultural Research, Phase II**, Volume 1, December 1980.

[a]Agricultural graduates have a B.S. or M.S. degree from the university. Agricultural diplomas have two years in the AETIs following ten years of primary and secondary study.
[b]In 1981, only 5700 of these positions were filled.

1980, only 5,700 village-level positions are filled from an authorized 7,800. This translates into a ratio of one union level agent per 1,200 families or 3,500 acres on average in the regions where the DAEM operates.

The agricultural expertise of the thana level is represented by the cadre of TAOs the TEOs who are usually selected from the ranks of union level agents. The AETI training and prior experience generally limit the capability of these officers to meet the technical and supervisory demands of the position. The average TAO has responsibility for about ten UAAs in an area of around 340 square kilometers with a population of up to 180,000 people in perhaps 200 villages.[44]

Thana level extension offices also are normally staffed with agricultural officers who are responsible for specialized areas of agriculture. For example, specialists are assigned for such activities as fisheries, jute, livestock, and plant protection,

and serve as commodity specialists for all unions within the jurisdiction of the thana.

The organizational structure of the DAEM extension system above the thana level is focused mainly on program coordination above the thana level and administration. Most of those who fill extension positions hold agricultural degrees from the university. The larger district and subdivisional offices also engage in technical programs through maintenance of staff specialists. These officers are assigned districtwide responsibilities to assist thana level TAOs and commodity specialists in program development and implementation. However, the number of commodity specialists is limited.

Investment in Extension

Financial support for DAEM extension programs has shown continual growth since 1973 (Table 8.14).[45] Expenditures in 1981 totaled about Tk. 102 million. Growth since 1973 has been 16 percent annually. Both are considerably lower than the allocations to research. In 1981, about 85 percent of the expenditures came from the current budget of the BDG which was a bit higher than for the most recent years. From 1978-80, about 55 percent were from the current budget. Since 1973, both the current and ADP expenditures have grown at the same compound annual average rate of 17.2 percent. Expenditures from the ADP budget include capital costs as well.

The level of total support has generally been considered inadequate to meet the expansive needs of the service. Based on an estimated 6,900 extension personnel employed in 1981 and the Tk. 86.3 million current expenditures, the outlay per extensinist by the DAEM was about Tk. 12,600 for the year or about $765. This seems quite low even if salaries for most VEAs are in the range of Tk. 500 to 700 per month.

Operational Programs[46]

The DAEM has initiated several program foci to improve the effectiveness of extension activities. A series of intensive crop production programs (ICPP) have been tried which incorporate the idea of a "package of technology" to expedite the diffusion of modern practices. This approach has been the basis for three such efforts dealing with transplanted aman, winter (rabi) crops, and aus production. Since 1979, all projects fell short of expectations, but some impact was had on the production of these crops. However, the general effectiveness of the extension effort has been in question for some time due to a number of factors.

The World Bank sponsored a trial test in 1978 of the effectiveness of the Training and Visitation (T and V) concept in Bangladesh. The initial test area was Rajshahi Division. Within

TABLE 8.14
Expenditures by Directorate of Agriculture, Extension and Management, Bangladesh, 1973-81 (thousand taka)

Fiscal Year	Current Budget	ADP Budget[a]	Total
1973	19508	19999	39507
1974	20956	14753	35709
1975	26446	1667	28113
1976	41534	4922	46456
1977	41441	13036	54477
1978	46378	18417	64795
1979	44511	35871	80382
1980	46652	40339	86991
1981	86329	15716	102045
Annual compound growth (percentage)[b]	17.2	17.2	16.0

Source: Directorate of Agriculture, Extension and, Management, Ministry of Agriculture.

[a]Estimated by least-squares trend line.
[b]Includes both capital and developmental expenditures.

the structure of the T and V system, special training for UAAs and VEAs was conducted by crop and other specialists at the thana and district level with initial assistance from expatriate specialists. The visitation part was a highly organized system where each UAA or UEA visited 160 specific farmers every two weeks on a rigorous schedule which was intended to insure a systematic routine and increase agent contact with producers. The World Bank is continuing its assistance to upgrade the extension system nationwide.

In addition to this particular attempt to test extension methodology and procedures, the DAEM has had other specially funded activities in the Chittagong Hill Tracts, Pabna District (especially in Serajganj), and seven selected districts for increasing fisheries and livestock production. Also, three multisectoral irrigation projects in Chandpur, Barisal, and Karnafuli involved extension inputs, as did a special program in sixty thanas focused on fertilizer adoption.

Other Extension Institutions

The extension activities of other agencies within the BDG are not so elaborate as the DAEM but are, nonetheless, important to the total extension effort. Some are formally organized with outreach staff while others follow a less-structured approach. The summary which follows discusses only a few of the major institutions engaged in extension acitivities.

Jute Extension Service (JES). The JES service is the largest and most structured of the units aside from the DAEM. Organized in 1971, the JES created a set of extension agents parallel to those of the DAEM. Jute Extension Officers (JEO) rank with SDAOs in the hierarchy of the organization. Yet most have had less formal education. In 1981, there were 132 JEOs as compared with 92 SDAOs in the entire country. At the farm level, Jute Extension Assistants (JEA) total about 1,500 and supervise about 200 acres each which permits much more intensive application of extension services than found with the DAEM. Jute extensionists are generally products of the Intensive Jute Production Scheme (IJPS) under which specialized training is received at the thana training and development centers (TTDC).[47] Few are graduates of the AETIs.

Integrated Rural Development Program (IRDP). Extension training is an integral part of cooperative development activities of the IRDP. The TTDCs fall under IRDP jurisdiction and conduct an ambitious program of extension courses using officers and specialists from the program. The Thana Irrigation Program (TIP), another IRDP activity, also serves as an extension media in transmitting information to water-user cooperatives. The extension activities of IRDP are based on prior experience of the Comilla cooperative project and has now expanded to about 64 percent of all thanas.[48] The concept relies heavily on local model farmers who become the potential vehicle for reaching a larger number of small farmers. Once selected, the model farmer is employed by the village cooperative and continuously trained at the TTDC. No evaluations of the effectiveness of the method of outreach were available.

Plant Protection Directorate (PPD). Plant protection officers operate at the district level as advisors to the DAEM extension staff. Generally each district office has two technical plant protection workers. In addition, 1,400 plant protection workers are in the field throughout the country.

BARI. The extension efforts of BARI are mainly encompassed in field days and demonstrations which result in farmer interchanges with scientists on its nineteen research stations.

Additionally, the BARI farm trial division operates 200 sites which generate extension contacts.

BRRI. Like BARI, BRRI conducts extension type activities on its five substations and its twenty-eight sites for rice-based cropping systems research.

Water Development Board (WDB). The WDB extension staff includes 200 field agents which service the five project areas where the board manages irrigation schemes. Additionally, each area has one chief extension officer.

Others. The above institutes constitute the major extension activities outside the DAEM. In addition, there are about fifteen other institutions which engage in some type of outreach. Generally, these include the other research institutes, the product development boards, the BAU, and several of the private volunteer organizations. The forms of activity vary, but, in a general way, they comprise some type of advisory assistance or the provision of seeds or seedlings. Some are more highly structured such as the research institutes for tea, tobacco, and sugar, wherein the integrated nature of the production and processing scheme leads to a heavier reliance by the producer on information and advice from the institutes. In the case of the BAU, extension activities are restricted to the region surrounding Mymensingh and are used also to enhance the training of agricultural students.

Most of the units engaged in extension are now under the jurisdiction of the MOA as a result of recent BDG reorganization. As currently structured, only SRI (MOI), the IRDP (LGRD), and the volunteer agencies are outside the administration of the MOA. The fragmented structures of extension which occurred earlier can be corrected, at one level at least, with such a large number of the units under MOA authority. However, there is no indication yet as to what internal reorganizations may be in store or whether any of the existing extension units will be merged.

Constraints and Prospects for Effective Extension[49]

The extension system must share with research the responsibility for an inadequate diffusion of new agricultural technology in Bangladesh. Even though all technological adoption does not follow the traditional research/extension pathway, the combined effectiveness of these two institutions goes a long way in determining the success level for dispersion of new production techniques. The research system has previously been judged as having a structural and scientific staff in place which has a moderately successful track record for producing useful information and a reasonable potential for becoming an effective scientific arm for the sector.

The condition of the extension service is more bleak. Recent evaluations have readily exposed the presence of poorly trained agents, duplication of efforts between DAEM and other extension units, inefficient use of personnel, and the absence of individual incentives to encourage quality work.[50] Additionally, lack of extendable technology, inappropriate national price policies, and untimely and inadequate agricultural credit also have imposed constraints on the extension effort.[51] Finally, funding shortages have created inordinate restrictions within the system. Travel, which is the lifeblood of extension, is curtailed by budget shortfalls. Resources for gasoline, per diem, and other materials are deficient, which often leave village agents bound to office work instead of making contacts with farmers. For example, the TAO in Mymensingh (Kotwali thana) is reportedly limited to Tk. 250 annually for travel.[52] Supervision, job perceptions, and other interpersonal and administrative relations likewise suffer from the immobility of people within the system. These are exacerbated by inadequate employment conditions such as low salaries and minimal opportunities for advancement, plus assignments to small rural communities that often require agents to live in substandard housing and, in many cases, to be separated from their families for lack of adequate education and housing.

A 1982 survey of the districts of Bogra, Rangpur, Rajshahi, Tangail, and Kushtia provides evidence of the informational gap in the agricultural sector which is leaving a large majority of farmers untouched by official sources of information.[53] Farmers in these areas relied most heavily upon informal sources, mostly neighbors, for agricultural information. Dealers were important in providing information about fertilizer. Only a very small minority, less than 2 percent, could identify the model farmer or contact farmer in their vicinity associated with the T and V and the IRDP extension schemes. Even smaller numbers reported having sought advice from formal institutional sources. Less than one-half of the farmers reported having attended local village extension meetings. About two-thirds were aware of village crop demonstration plots, but only a few could describe their purpose or utility in any detail. Most farmers were not acquainted with recommended fertilizer use levels, but even among those who were, typical applications were from 25 to 50 percent less than officially recommended. Interestingly, those who most often utilized official information sources and recommended fertilizer levels were also those who tended to have achieved the highest levels of education. Inaccurate economic analysis was identified as a major reason that farmers did not accept official recommendations for farm inputs.

The extension service does not have the same potential for effective programs as found in the research system. Both infrastructure and funding are lacking and the number and capability of the personnel are in question. Extension

effectiveness continues to suffer from proliferation among agencies and wasteful interagency competition for outreach resources and, when combined with the continuing monocrop focus, raises doubt regarding the ability of the system to deliver the quality services that are needed.

There have been pockets of successful extension assistance. The help in encouraging shallow tubewell adoption in Bogra, extension's role in assisting the diffusion of new CIMMYT wheat varieties, and the historic influence of extension in the Comilla area are examples. But, overall, the picture for effective extension is discouraging and becomes more so when one views the extensive expansion in agent numbers that is being contemplated. It is very doubtful that the current system can support this magnitude of change within the suggested time frame. There is a basic issue of priority and cost effectiveness in the BDG decision to undertake such a dramatic expansion of the extension system which should be addressed.

Extension - Research Linkages

Historically, the linkages between research and extension workers have been weak. Contact has been limited and the passage of information and ideas have not been sufficient to have a meaningful impact on the appropriateness of the new technologies being researched or on the improvement of VEA capability to represent improved practices to growers. In large part, the current scenario has not changed. For many crops and in most areas of the country, the impact of extension on the research process is minimal, and field contacts between personnel of the two branches are mainly informal. A formalized procedure for systematically involving the extension personnel in formulating research plans is not part of the overall research planning mechanism.

Yet, some parts of the system have stronger research-extension linkages due to the monocrop research responsibilities assigned to them. For some crops such as tea and tobacco (and, to a lesser extent, sugar), the integrated nature of the relationships commonly place researchers in the field with both VEAs and growers. The "service" aspect placed on the research and extension functions, plus the smaller number of producers, contribute to a more responsive climate. Other improvements are occurring, particularly within the rice program. The annual in-service courses of BRRI and BARI bring thana level extension officials for a two-week briefing on new technologies which includes discussions between researchers and extensionists. Also, both institutes have held research planning sessions with the DAEM for the last two years. Several stations, especially BARI and BRRI, are giving added attention to on-farm testing of research which increases the exposure of the research program to those closer to the production constraints. Additionally, the

BDG has created four regional demonstration centers at Jessore, Chittagong, Ishurdi, and Jamalpur designed to improve the linkages between the research/extension/grower levels. The emphasis on the farming systems in the research program also should improve the contacts and information flow from the farm level to the research activities.

Summary

The human capital and scientific base in agriculture are critical to the developmental process. Creation of this capability depends heavily on the educational system and its effectiveness. Bangladesh has an extensive and diversified educational system. The regular primary-secondary sequence begins at age five. Students who wish can end their formal studies after the tenth grade and with a successful completion of the public examination for a Secondary School Certificate (SSC). Those who continue through the twelfth grade and complete a second public examination receive a Higher Secondary School Certificate (HSC). A parallel system of religious education is also available through the Madrasha offerings. Additionally, the system provides for vocational, technical, and professional courses of study within various degree, diploma, and certificate options which are available from numberous training institutes and centers at various levels following the SCC examinations. The post-high school system involves both degree colleges and six major universities.

The system is financed by both public and private sources. Primary schools and universities are mainly supported by public funds. Most secondary schools, religious units, and degree colleges are generally under private management. However, the total system is administered by the Ministry of Education. In 1981, there were 56,385 schools and training institutes at all levels which employed about 330,000 teachers. Enrollments totalled about 10.9 million students. Despite the seemingly large numbers, this is only a small percentage of the total students who should have been enrolled in school. For those within the age groups for grades one to twelve, only 38 percent were enrolled in 1981. Dropout rates are extremely high. Growth in attendance at public schools has not kept pace with population. However, since 1976 enrollment growth in medicine, vocational, and technical schools has been higher than population growth.

Aside from the primary and secondary schools which train rural residents, agriculture is served by several special educational and training institutes. At the higher levels, the Bangladesh Agricultural University and the Bangladesh Agricultural College teach most students. Extension personnel

are trained in twelve agricultural extension training institutes, while local rural governmental officers and agricultural cooperative officials are trained in the Bangladesh Academy of Rural Development. Generally, most of the training programs are not adequate for Bangladesh's needs.

Most of the agricultural research is carried out by nine major research institutes, although as many as twenty conduct some type of agricultural investigations. The major institutes are monocrop programs which do research on rice, jute, sugar, livestock, tea, fisheries, and forestry. One institute has multiple-crop responsibility and another conducts research on nuclear energy and agriculture. Financial support for agricultural research has grown extensively since 1976 but still appears to be too low. About 60 percent of the research budget is domestically financed. The human capital base in agriculture is far better than that found in many LDCs but still is not totally adequate. The same is true for research facilities. The research system is young and still evolving and is judged to be quite promising on the basis of research development and output to date.

The extension service has been fragmented considerably since each monocrop research institute has outreach responsibilities. The national extensive service employees about 50 percent of all extension personnel and operates throughout the nation. There are about 9,000 authorized positions in the national service. The system has generally not been effective, suffering from shortage of funds, ill-trained personnel, an absent incentive system for employees, and a combination of unbalanced national policies and lack of extendable technology. The current condition and effectiveness of the extension system is bleak. The linkages between research and extension are judged to be generally weak and inadequate.

Footnotes

[1]For example, see David Ricardo, The Principles of Political Economy and Taxation (New York: MacMillan, 1909).

[2]Vernon W. Ruttan, "Induced Technical and Institutional Change and the Future of Agriculture, The Future of Agriculture," in Theme Papers, presented at the Fifteenth International Conference of Agricultural Economists, Sao Paulo, Brazil, August 1973.

[3]Theodore, W. Schultz, "Economic Dynamics of Agricultural Development," public lecture, November 7, 1980, Jakarta, Indonesia (Mimeo), P. 3.

[4]Government of Bangladesh, Bangladesh Education System, Ministry of Education, Mimeo, Publication No. 6, 1982, pp. 1-4. The Madrasha is a special educational system which emphasizes Muslim training along with secular education.

[5]Not all students pass the public examinations. In 1982, 58 percent were successful nationwide in the SSC examinations. Only 28 percent passed the HSC examinations.

[6]Homeopathic medicine is the system of medicine which treats a disease by the administration of minute doses of a remedy that would, in healthy persons, produce symptoms of the disease being treated.

[7]Government of Bangladesh, Bangladesh Education System, p.9.

[8]S. A. Qadir, and K. S. Ahmed, Role of Education Projections in Educational Planning in Bangladesh, (Dhaka: National Foundation for Research and Human Resources Development, 1980), p. 12.

[9]World Bank, Bangladesh: Recent Economic Developments and Selected Development Issues, Report No. 3768-BD, March 3, 1982, p.53.

[10]Ibid., p. 54.

[11]Ibid.

[12]Government of Bangladesh, Flow of External Resources into Bangladesh, Ministry of Finance, November 6, 1981, pp. 140-141.

[13]Abul Mansur Ahmed, End of a Betrayal and Restoration of Lahore Resolution (Dhaka: Khoshroz Kitab Mahal, January 1975).

[14]World Bank, Report No 3768-Bd, p. 56.

[15]Ibid., p. 61.

[16]For a conceptual discussion of agriculture's contribution to the formulation of the nation's human capital base see: Wyn F. Owen, "The Double Development Squeeze on Agriculture," American Economic Review 56 (March 1966): 42-70.

[17]A description of the six universities can be found in: Ministry of Education, Reforms from the Universities, University Grants Commission, October 1981. Estimate of percentage of females attending universities is from this same publication.

[18]Information for this section has been drawn extensively, or quoted from USAID, Project Paper: Agricultural Research, Phase II, December 1980, Annex E.

[19]Ibid., p. 2.

[20]Information for this section was obtained from: Department of Agricultural Extension and Management, Annual Report, 1979-80 and 1980-81.

[21]Ibid., p. 64.

[22]Cooperative Statistics and Research Organization, Cooperative Movement in Bangladesh During 1980-81 - An Interim Report, November 1981; pp. 24-25.

[23]A. H. Moseman et al., Bangladesh Agricultural Research System, Report of Review Team, USAID/BARC, July 18, 1980, pp. 35-37.

[24]Prior to the recent reorganizations, ten ministries were involved in the management of the total research complex.

[25]Information for this section was extracted from: Bangladesh Agricultural Research Institute, Annual Report 1978-79, September 1981.

[26]Information for this section draws heavily on: The Bangladesh Rice Research Institute, Annual Report 1978-79, September 1981.

[27]This section draws heavily on: Bangladesh Jute Research Institute, "Annual Report for 1981," March 1982.

[28]Information for portions of this section was extrapolated from: BTRI, Annual Report, 1978.

[29]BARC, This is BARC, December 1980, p. 45.

[30]Moseman, et al., Agricultural Research, p. 30.

[31]USAID, Project Paper, Annex C, p. 7.

[32]Swedish International Development Authority, Development of the Institute of Nuclear Agriculture, Report of a Review Mission, Vienna, 1980, p. 8.

[33]Sugar Research and Training Institute, Annual Report 1981, Publication No. 25, December 1981.

[34]Gerard J. Gill, Operational Funding Constraints on Agricultural Research in Bangladesh, Bangladesh Agricultural Research Council, Report No. 9, April 1981, p. 23.

[35]Thomas M. Arndt, Dana G. Dalrymple, and Vernon W. Ruttan, Resource Allocation and Productivity in National and International Agricultural Research, (Minneapolis: University of Minnesota Press, 1977), p. 34.

[36]The general problem of internal administrative and procedural constraints is also recognized in: Moseman, et al., Agricultural Research, p. 41.

[37]For a detailed description of case studies involving these types of problems in Bangladesh see: Gill, Agricultural Funding Constraints.

[38]Swedish International Development Authority, INA Evaluation, p. 6.

[39]Moseman, et al., Agricultural Research, p. 41.

[40]Ibid.

[41]Bangladesh Abricultural Research Council, "Scientific and Technical Periodicals of Bangladesh," Library and Documentation Center, Mimeo, Undated, in possession of USAID/Dhaka.

[42]Information for this sections draws extensively from: Department of Agriculture Extension and Management, Annual Report, 1979-80 and 1980-81.

[43]Ibid., pp. 2-3.

[44]USAID, Research Project Paper, Annex D. p. 3.

[45]Expenditure data for extension activities by other BDG institutions are not included.

[46]DAEM, Annual Report, pp. 17-45.

[47]USAID, Research Project Paper, Annex D, p. 5.

[48]Ibid.

[49]For a discussion of general constraints see: Murray D. Dawson, "Effective Transfer of Improved Technology," Technical Papers in Agricultural Research, International Agricultural Development Service, Vol. I, 1978-81.

[50]USAID, Research Project Paper, Annex D, p. 8.

[51]DAEM, Annual Report, p. 68.

[52]USAID, Research Project Paper, Annex D, p. 3.

[53]Gerard J. Gill, Pilot Survey of Farmers Sources of Information, Agricultural Development Council, Dhaka, November 1982. The survey covered 40 villages and had 360 total respondents.

CHAPTER 9
FACTORS AFFECTING AGRICULTURAL GROWTH AND MODERNIZATION

"All who have meditated on the art of governing mankind have been convinced that the fate of empires depends on the education of youth."

Aristotle

Introduction

Characterizations of Bangladesh as a developmental "basket case" are inaccurate, misleading, and unfortunate. The analysis of agriculture in Bangladesh in this assessment reveals a sector that is making progress in its struggle to modernize--progress which in some areas is impressive.

It is true that Bangladesh still faces substantial obstacles in its efforts to become self-sufficient in the production of food and to bring improved welfare to its people. The conventional wisdom which characterizes Bangladesh's situation as hopeless belies the strengths and potentials which exist within the agricultural sector and which provide a basis for cautious optimism about the future. This chapter identifies those strengths as well as the obstacles which constrain the growth and development of agriculture.

Factors Contributing to Agricultural Development

BDG Support of Agriculture

The support of the BDG for agriculture is a significant force in the scenario of factors contributing to development in Bangladesh. Since the early days of independence and the development of the first five-year plan, agriculture has been accorded a priority position in the BDG strategy. This early commitment has not lessened with time. The BDG has retained a reasonably consistent position on the importance of agriculture, even to the present. However, the focus on agriculture has been blunted somewhat by the concern for food security which has lessened the actual resource allocations to agriculture and

likely dampened producer incentives. Past BDG policies and programs implemented in the name of food security have often diminished and sometimes distorted development--the policy of cheap food being the most glaring example.

Despite this historical competition for funds, the BDG's financial support to agriculture remains impressive. Approximately, 30 percent of the ADP and about 2 percent of the recurrent budgets have been directed toward agricultural programming and development annually since independence, although actual disbursements have been somewhat lower. By comparison, this is a considerably higher proportion of the national budget than is assigned to agriculture in most LDCs. As a result, the foundation for much of the current expansion in HYVs, irrigation, and fertilizer use was put in place through the early establishment of indigenous research facilities and a fertilizer distribution system plus other forms of agricultural related investments. More recent policy reforms have also contributed.

As the BDG has grown and matured during these twelve years, so has its fundamental commitment to agricultural growth and development. While still plagued with the issue of food security, there is evidence of a growing support for modernizing agriculture. At the same time, the BDG has demonstrated a flexibility in public policy which has led to modification in programs and priorities. While agriculture has not been accorded significant annual budgetary adjustments which would reflect a clear shifting of finances to development of the sector, the BDG movements toward divesting publically held corporations, privatization of fertilizer and irrigation equipment distribution, and removal of subsidies in both factor and product markets are all indicative of a positive response to agricultural developmental needs. Increasingly, it appears that the BDG is coming to recognize the basic importance of increased agricultural productivity and is making appropriate policy choices to permit a more rapid acceleration of the process. If maintained, this philosophical foundation will greatly enhance the impact of the other positive factors which are currently emerging or which now exist in the sector. The impact will be even more consequential if additional financial support is provided, especially for developing a superior human capital and scientific base for the sector.

Natural Resource Base

Bangladesh has an impressive natural resourse base upon which to build a productive agricultural capability. Soil fertility and structure are generally good and reasonably uniform, and there is a demonstrated responsiveness to fertilizer, water, and high-yield varieties. At present, 60 percent of the land area is under crop cultivation at an intensity of about 154 percent. The land base is capable of supporting much higher crop and animal

production, principally from expansion of multiple-cropping and more intensive use of the land.

Perhaps Bangladesh's greatest natural resource is the massive supply of surface and groundwater for irrigation. The supplies are readily and economically available. Surface pumping is feasible during much of the year. Groundwater supplies are unusually easy to tap with large quantities available at depths of twenty feet or less in many areas of the country. There is, however, extensive flooding almost every year which limits production alternatives in low-lying regions. Rainfall patterns sustain an extensive rice production system during the monsoon, which, when combined with the irrigation water available for the dry season, leaves Bangladesh with an enviable water endowment.

The topography is not highly variable, and climatic variation is not dramatic. The flatness of the terrain also lessens the scope of opportunities for hydroelectric development. The climate and temperatures are ideal for multiple-cropping and, in most regions, year-round production is possible. Furthermore, Bangladesh has supplies of natural gas which offer an economical source of fuel for power generation and a raw material for urea fertilizer production. There are no known mineral resources of great consequence. Bangladesh's endowment of natural resources represents a very positive base for expanding agricultural productivity.

Demonstrated Farmer Response to Economic Incentives

An increasing number of Bangladeshi farmers are responding to new production opportunities by adopting more cost-effective biological technologies. In doing this, they are demonstrating a basic awareness of economic relationships which is vital to the developmental strategy for agriculture. The numbers are still not adequate, but the illustration of economic responsiveness among some farmers generates optimism that widespread changes can occur as the effects of demonstrations by initial innovators expand to other farmers and the availability of modern technologies is enlarged by the research and extension system and the industrial sector. There are a number of changes which clearly illustrate that Bangladeshi farmers are knowledgeable and responsive to these new options.

The dramatic rise in wheat production from the adoption of HYVs, fertilizer, and irrigation is one of the most visible of farmers' responses to new economic alternatives. The rapid increase in the production of boro rice utilizing HYVs, fertilizer, and power pumps is another example. Similar farmer responses are apparent in mustard and potato production. The historic shifting of cropping between rice and jute is another illustration of the awareness of farmers within the sector to changing economic indicators.

The magnitude of adoption and the yield-increasing nature of the technology being accepted suggested Bangladeshi farmers are moving the nation along an efficient path of technical change. Chemical and biological innovations which increase yields are the appropriate economic response when land is the scarce input and labor is abundant as in Bangladesh. This is how Bangladeshi farmers increasingly are responding (the considerable rise in modern inputs has been documented above). The demonstration of economic viability for new techologies is of particular import given the strategic need to generate increases in factor productivity among a much broader base of farmers. The trends in farmer acceptance of more modern technologies in response to market forces operating in the agricultural sector constitute a basis for optimism and suggest that more widespread adoption is likely to occur. The process will be enhanced by sustained BDG investments, especially in people, research, and extension, but also in programs to improve the availability of modern factors of production. Given the limited land base, agricultural production can only rise in Bangladesh with increased intensification of land productivity, and this makes such investments both logical and urgent.

Promising Agricultural Technology Base

Bangladesh has a promising technological base and research system serving agriculture. The expansion in agricultural productivity will have its genesis in new agricultural technology. The type of technology will vary from new and adapted crop varieties to innovative farm management and cultural practices. Two factors are fixed and will not be altered. First, new technologies will be mostly chemical/ biological in nature. Secondly, they will come from the indigenous research system. It will be argued later that there is a need to augment significantly the effectiveness of the research system if agriculture is to be modernized and production expanded. But Bangladesh now has an emerging research capability which, if given proper assistance, can grow into an effective research system. Local scientists are making important contributions to new technical knowledge. An good physical infrastructure and an understanding of the scientific process is already in place. Certainly, development of a research capability will not have to start at zero, and this can permit a more rapid emergence of institutional capacity to produce streams of requisite technical innovations.

Even more important to the immediate future of the agricultural sector, however, is the promising technological base which is already available. Adoption of new domestically developed HYVs for several crops including rice, wheat, mustard, and pulses is gaining momentum. Fertilizer use has increased significantly over the last decade with a significant share of

nitrogen being produced domestically. The rapid development of irrigation resources, particularly shallow tubewells, is equally impressive. Irrigation development can be significant in and of itself, but, in the context of Bangladesh development, it has added importance. Irrigation is the critical missing input which, in many regions of the country, completes the package of new technology by permitting HYVs to respond to increased applications of fertilizer. High returns to investments in HYVs and fertilizer depend completely on adequate and timely application of water. Farmers increasingly are developing their own irrigation water or purchasing it from neighbors. Given increased irrigation, it seems realistic to expect a continued expansion in the use of high-yield varieties and fertilizer not only in rice and wheat but other crops as well.

The modern technological base now being utilized will have to be more broadly diffused if it is to result in significant increases in production. The potentials are high and, given the demonstrated response of farmers to economic incentives, the probability of significant production changes from adoption of already proven technologies is one of the sectors' more promising strengths.

Human Capital for a Science Based Agriculture

Bangladesh has, at least relative to other LDCs, a good sized cadre of agricultural scientists and technicians to support the development of a science based-agriculture. A large number of Bangladeshis hold advanced degrees in the agricultural sciences from foreign universities. Many of them are now found in the research system, the universities, and the public services sector where they occupy positions of importance and are able to influence the policies and programs of the BDG.

As with some other constraints, it will be argued later that greater attention must be given to development of human capital, but the base of available people with higher level scientific and technical skills is impressive and provides an excellent foundation for strengthening the existing institutional infrastructure so vital to the long-run viability of agriculture.

Science is the backbone of a modernized agriculture. Agricultural development relies heavily on the scientific, technical, and professional orientation of people working together in an appropriate institutional framework. Scientific skills are needed to produce new technical knowledge and information which will help farmers overcome constraints to production imposed by weather, disease, pests, soil deficiencies, and other environmental, economic, and cultural conditions. The agronomic and socioeconomic problems confronted in Bangladesh agriculture are dynamic and relatively complex because of the subtropical environment and multiple- cropping system. Solutions to these problems require a viable institutional system with

competent scientists to sustain a continuing flow of updated information and new technical knowledge. Fortunately, Bangladesh has passed the initial stages in its quest for this capability. The level and quality of agricultural scientists and technicians is a decided strength. The modernization of agriculture will advance much more rapidly because of it, especially if the related institutional deficiencies (discussed below) are given appropriate attention and if the base of human capital is improved further.

BDG Commitment to Education

It may surprise some to see BDG commitment to education specified as a strength in the milieu of factors affecting agricultural development, especially in view of the inadequate state of education in Bangladesh. It will be argued later that improvement in the educational system is essential if progress and development are to occur in agriculture. This is because increased levels of literacy and education among rural people are important factors conditioning the rate of adoption for improved technologies. The major changes required to improve the educational system, however, are not possible without strong support from BDG leadership.

It appears that such a commitment now exists within the BDG. The present deficiencies which are so restrictive are the product of past failures to understand the fundamental importance of education, the shortage of financial resources, and the absence of a resolute will to address the difficult task. The fact that the BDG has opened the door to such reforms is a strength to be built upon. Public pronouncements by the BDG supporting improvements in the educational system are a basis for optimism that changes can be forthcoming.

Growing Industrial Sector with Linkages to Agriculture

Bangladesh has an emerging industrial sector, linked directly to agriculture, that is increasingly moving towards private sector management. The early nationalization of many industries, including a large number of directly involving to agriculture, had led to a deterioration in operational efficiency and had virtually paralyzed private investment. Most of these firms were oriented toward the processing and marketing of agricultural products. In the last year, the BDG has increased the number of divested public firms. If raised to more efficient levels of operation, these firms can create strong raw material market outlets for some agricultural products.

The emergence of several industrial firms which supply modern inputs for the agricultural sector is especially noteworthy. The construction of additional capacity for fertilizer production to complement existing plants will lead to self-sufficiency in

nitrogen in the foreseeable future with consequent savings of foreign exchange and, perhaps, an exportable surplus. Furthermore, several types of irrigation pumps are now being produced and marketed by smaller local firms. Reportedly, these are of acceptable quality, and the productive capacity can be expanded as the market grows. These firms create domestic employment opportunities for local workers and, at the same time, reduce the foreign trade deficit. The importance of such impacts cannot be overemphasized and becomes especially significant in the case of fertilizer where large amounts of foreign exchange are involved.

Emerging BDG Support of Market Allocations

Very recently there has been evidence of a changing attitude by the BDG to allow market allocations to play a role in several areas of former governmental control. After independence, the BDG's general commitment was to intervene at almost all levels of economic activity. This led to a strong reliance on nonmarket processes for the allocation of scarce resources. The marketplace was distrusted as a basis for resource allocation and product distribution, especially where products of perceived high national interest were concerned, e.g., food. Only the less important crops were left free to market determinations.

The trend for both factors of production and products is now toward less governmental control. In particular, fertilizer and irrigation systems are being left increasingly to market pricing and distribution. Additionally, the public rationing system for foodgrains has recently equated procurement and offtake prices for the first time. The emerging willingness of the BDG to increase its reliance on market allocations bodes well for improved efficiencies within the system in the allocation of both public and private resources. While free markets are not a panacea for all of Bangladesh's problems (and should not be considered as such), providing a wider role for the market should bring a better balance in the mix of public and private sector operations and reduce the management and financial stress on the BDG in addition to an improvement in allocative efficiency. As a result, it will facilitate agricultural growth and development.

Foreign Donor Support

Foreign donor support is expected to continue at relatively high levels and on concessional terms that will underwrite the nation's developmental program. Bangladesh has avoided major food shortages in the past by virtue of the willingness of the foreign donor community to make significant contributions towards filling shortfalls in food needs and to provide extensive project and commodity assistance. The assistance has been tendered on highly concessional terms, both by multinational agencies and by

bilateral donors. The terms are so favorable that the debt servicing situation of Bangladesh is the one public finance area that is not a serious problem.

Aspects of donor asistance have caused fiscal stress on the BDG, and the overall system is not free from defects. At the same time, some feel that aid, with its extensive focus on commodity imports, has created ever-increasing dependence on external assistance. Yet, the donor system functions reasonably well. Most of the previously mentioned strengths in the sector have evolved, at least in part, because of donor support directed towards modernizing agriculture. The projections of continued donor support at high levels is a factor of considerable consequence to the future of agricultural development.

Example Models of Development

Successful development by other Asian nations under conditions similar to those currently facing Bangladesh is a highly visible reminder that rapid agricultural and economic growth is possible. Japan, Korea, and Taiwan are examples of other nations in the region which successfully made the developmental transition. All were basically rice monocultures with extreme population pressures. All began the developmental process with traditional agricultural systems and with reasonably homogeneous populations and predominant cultural structures which, in many ways, enhanced the potentials for change. Admittedly, other factors such as dissimilar trade potentials, foreign assistance availability, and the initial levels of human capital, to name a few, present a disparate set of conditions that may define a more formidable task for Bangladesh. But, the knowledge base and experiences acquired during the transition of these nations are available for study and use as models by Bangladesh. Moreover, they provide Bangladesh with clear demonstrations that success can be achieved. Believing that success is attainable is a vital ingredient in developing a national motivation and momentum.

The state of knowledge about Asian agricultural development has expanded dramatically in the last three decades. IRRI, CYMMIT, the Asian Vegetable Research and Development Center (AVRDC), and the national research systems of several developed countries in the region have produced a spate of HYVs and improved cultural practices. Bangladesh has and is borrowing freely from these new technologies either to utilize new HYVs directly where appropriate, such as HYV rice and wheat, or to utilize HYV germplasm in its adaptive research program. Consequently, the gestation period for Bangladesh's fledgling research program has been substantially shortened. Bangladesh has already released its own HYVs for wheat, rice, mustard, and pulses. Their adaption from imported germplasm has saved years.

Most of the strengths cited in this section as fostering agricultural development are not without deficiencies. Gaps still exist, and in several areas trends are just beginning to emerge which appear to offer favorable potential for the future. The agricultural sector is struggling, but progress is apparent. Even more rapid and pervasive growth can occur if effective new programs and policies can build on the present strengths and overcome the existing constraints.

Constraints to Agricultural Development

The future of agriculture in Bangladesh hinges on eradicating the obstacles which now restrict sectoral output. The sector's performance since 1973 has been inadequate to generate a general increase in economic welfare. Growth in real gross domestic product per capita, while respectable, has not been sufficient. The nutritional status of many appears to be declining from its inadequate level of 1976. Real incomes likely have declined for many consumers and relatively more for the poorest, which has worsened an already inequitable distribution of income. Important as these conditions are to the welfare of the people of Bangladesh, they are not the basic impediments to agricultural growth. Rather, they are symptoms of a more basic set of inadequacies which constrain the advancement of agriculture. It is the causes of agricultural traditionalism that must be addressed and not the symptoms.

The following are the major constraints identified in this assessment which limit future agricultural growth. They comprise the group of issues which must be confronted if Bangladesh is to have a reasonable chance to balance the food and population equation.

Inadequate Research Base

The process of modernizing agriculture as the basis for rising productivity is almost totally dependent on the generation of new technologies. The resource mix in Bangladesh, with its large population and limited land, dictates a strategy of increased output per unit of land and a related rise in intensity of land use if growth in agricultural production is to proceed efficiently. This will require the development of a wide range of new agricultural technologies, which is the primary responsibility of the research system. There is a need to strengthen the limited institutional capacity of the research system and augment its output.

There are still constraints in the research system which prevent an increase in research information. First, the commitment of the BDG to research as the basic vehicle for

promoting agricultual development needs to be strengthened. The investment per researcher is too low, especially based on the level of operating funds. While the physical infrastructure is generally adequate, the incentive system is not. Salaries are relatively low, and professional recognition and opportunities for advancement are few and far between. As a result, the morale of the system is suffering, and a large number of agricultural professionals are working outside of Bangladesh.

The inadequate operating budget support for research is of considerable concern. The level provided is generally too low, and disbursements are delayed sometimes as much as six months. As a result, programs are delayed, facilities and experimental fields too often are neglected and rendered inadequate for research, and research results are not always published. The overall atmosphere is one of better than average facilities and programs rendered less effective by inadequate budget support and fiscal administration.

The mix of the research program in terms of subject matter and crops appears suboptimal. The heavy focus on genetic research is typical of early LDC research programs. The highest payoffs are not always found in genetic improvement, especially after initial increases in yields. Most of the newly released Bangladeshi varieties are not providing significantly higher yields than the early IRRI varieties, but they have captured other qualities such as tendencies toward disease resistance. On the other hand, attention to soil fertility, water response, and cultural practices may provide increases in yields above the increments possible from further genetic improvements.

Information on crop rotation seems especially deficient and needed at the moment. Likewise, research on irrigation response and water management procedures is fundamental to increasing resource productivity on farms where irrigation is being practiced and as a catalyst to encourage adoption of HYVs and associated irrigation. For the most part, the research system has not yet provided an adequate flow of technical information on irrigation and water management to allow reasonable control of the agricultural environment. With improved technologies and adequate information, some of this susceptibility of agriculture to the vagaries of the weather can be alleviated.

There is an imbalance in research among crops, especially in view of the information of value to producers. Rice is an important crop and heads the list of both research effort and accomplishment. Jute, a crop of basic export importance, does not appear to have had significant research effort. Other crops, such as cotton, which are of national significance and which offer import substitution potential have not received widespread research attention. The research effort must eventually succeed in increasing the production of many food crops (pulses, fruits, vegetables, etc.) if dietary quality in Bangladesh is to improve and the risks associated with a monocrop agriculture are to be

reduced. Research information on forestry and fishery also is unsatisfactory in view of their potential. Livestock research is totally inadequate to support any kind of meaningful effort to improve either animal food production or animal draft power. Proliferation in individual programs and duplication of efforts indicates an inadequate internal coordination of the national research program. In very recent years, BARC has been strengthened as the national leader and coordinator. Previously, the diverse elements of the research system were relatively autonomous and uncoordinated. BARC deserves the support of both the BDG and the donor community to solidify its role as leader of the national research system.

There is a need to strengthen the linkages of the research system to and in coordination with sister programs, both domestically and internationally. The effectiveness of the total effort to develop a science-based agriculture can be substantially improved by a closer integration of the research, extension, and teaching functions throughout the entire system. Additionally, the absence of close university-ministerial coordination is a serious deficiency in the agricultural information system.

Limited Agricultural Diversification

Since 1973, major increases in land use have been associated only with rice, wheat, and potatoes, while jute has lost the most acreage. More marginal changes have occurred with mustard and some pulses. Land use for most other crops has remained essentially unchanged except in some isolated cases where irrigation and market access have made shifts to higher cash crops possible but not on a scale anywhere near comparable to the two or three major crops.

The importance of foodgrains in the products mix of agriculture is a potential impediment to the long-run adjustments and development within the sector. In agricultural production systems where land is the limiting input, flexibility to shift profitably among a wide range of production alternatives in response to changing economic conditions is a hallmark requirement if farmers are to maintain a high level of production efficiency. In Bangladesh, these options are not extensive. The consequences of such limited flexibility are all too apparent. For example, the overall price inelasticity of demand for rice implied by the stability of the crop mix (and related consumer diet) make it very likely that small changes in supply will generate wide price fluctuations for rice. These changes can prove costly for farmers caught in a static production system and unable to make rapid marginal shifts in crop mix. Secondly, the lack of a wider range of production alternatives limits the ease

and speed of adjustment and impedes farmers' managerial flexibility. This could be especially meaningful if aggregate rice production were to rise significantly for several successive years causing major reductions in rice prices and if farmers were without realistic substitutes. Farm incomes could suffer, and resources could be held in rice production instead of being able to shift to alternative uses. Finally, reliance on a strong monocrop agriculture subjects the sector to much greater risk of catastrophic damage from insects and diseases. Some protection is currently given by the three distinct seasonal rice crops. But this distinction will likely diminish as irrigation tends to reduce seasonality resulting from water need, and crops are merged as is now occurring with "braus" (a combination of boro and aus crops).

The agricultural sector of Bangladesh is presently ill-prepared to confront changing conditions with accompanying significant resource adjustments, primarily because adequate options are not available. The research system has not yet provided sufficient numbers of profitable alternatives. In those cases where research has been successful (for example, wheat, potatoes, and mustard), both farmers and consumers have responded; and these examples provide evidence that widespread diversification of production is feasible. Without a more diversified product mix, the sector is likely to experience undue rigidities which will curtail resource adjustments and limit both the modernization and growth of agriculture.

Ineffective Outreach-Extension Support Base

The science information system serving agriculture must integrate research and the outreach activities of the extension service. Presently, the extension service in Bangladesh is much less effective and not as well-developed as the research system. Most agents are inadequately trained; and the system lacks effective coordination, administration, and performance. Operating budgets are low, which places serious restrictions on travel for lack of gasoline, per diem, and vehicle maintenance.

The proliferation of extension functions is of primary concern. In addition to the DAEM, some of the research institutes have their own extension services. In large measure, the crop speciality orientation of the research effort has argued for a vertically integrated organization and specialized personnel.

The approach has not been successful due in part to an absence of qualified extension personnel. A large majority of extensionists receive their formal training in AETIs with certificates being awarded following three years formal study after the tenth grade. Others are trained from the "Model Farmer" Program of the IRDP. High levels of technical expertise are not obtained in either training effort. It is true that some

technological adoptions will occur without the benefit of a structured outreach system. Total reliance on the "grapevine" system, however, will not serve the needs of Bangladesh. A more structured and efficient extension service is needed to diffuse the increasing amount and quality of new technical knowledge.

Inadequate Investment in Human Capital

The rate of investment in human capital is low, and the consequences are of great importance to Bangladesh's future. Constraints are found throughout the entire agricultural complex including the research, education, and extension systems, public agricultural policy formulation and administration, supply industries, processors, exporters, and especially among farmers. The diversity of deficiences range from inadequate numbers of agricultural scientists and technicians to a largely illiterate rural population. Only a relatively small percentage of people in Bangaladesh receive much formal education. Upwards of 80 percent of the school population leave school before they complete the final secondary year.

The consequences of not investing more in people are pervasive and touch at the very core of attempts to achieve innovation and change. When some forms of basic communication are not universally possible, introducing new technologies becomes a difficult task. Without improved levels of human capital, the agricultural sector will remain tradition-bound.

The primary-secondary secondary system is ill-prepared at present to meet the enormous challenge of educating Bangladesh's burgeoning population. Facilities need upgrading, teacher salaries are low, books and daily operating supplies are limited, and the curricula are not appropriate to the needs of an agrarian society. Furthermore, the administrative structure is an ill-defined composite of public and private management which perhaps best illustrates the disarray found in the educational system.

The situation is particularly critical when one considers the focal role people must play if more rapid and efficient agricultural development is to occur in Bangladesh. The present state of underdevelopment is, in large part, a result of a developmental strategy which has been based more in natural resources than in people. Future increases in the productivity of agriculture will be determined largely by the new technical knowledge produced and disseminated by agricultural scientists and technicians and ultimately by farmers who will utilize modern factors of production which incorporate such innovations. People make land productive, and investment in people is the principal factor which will determine the future of Bangladesh's agriculture.

A critical mass of highly trained scientists and technicians is vital to develop and maintain a flow of new technical information which releases constraints to production at the farm

level. Furthermore, the flow of information from the research/extension system enhances the returns to investments in primary education and literacy programs in rural areas. Without sustained flows of new technical knowledge, there are less incentives for farmers to invest their time in learning new skills. This is one explanation for the relatively high dropout rates at the primary school level.

Investment in highly trained agricultural scientists, technicians, and research and extension institutions serving agriculture is a sine qua non for progress in agriculture. Concomitantly, a nation cannot modernize its agriculture and break the social, cultural, and economic constraints which bind it when the mass of its population are uneducated. Many change factors are related to education, ranging from rising agricultural productivity to exportable labor skills to a higher prevalence of family planning. The whole system of individual and social awareness is unlocked if the human mind is given the tools to expand and better perceive alternative opportunities. This, in turn, contributes directly and substantially to agricultural growth and the progress of a nation.

In Bangladesh, this is a seemingly endless task requiring large amounts of funding. The rates of return have been high in societies which have made such investments. In fact, worldwide comparisons have demonstrated not only the fundamental importance of all levels of educational investment but also its relatively greater contribution to increases in agricultural output when compared with natural resource endowments and even new technologies.[1] Agricultural development has been slowed considerably by inadequate human capital in Bangladesh. Future progress will be limited until greater attention is given to investment in people at all levels of the educational system.

Excessive BDG Market Interventions

The recent emergence of BDG support for increased reliance on the private sector has been cited as a positive element upon which agricultural growth can proceed. There is, however, room for significant improvement. In the past, there have been high levels of BDG intervention in both factor and product markets which have distorted relative price relationships and created a reliance on subsidies. These subsidies impose an increasing burden on the BDG budget. The interventions have taken many forms from price fixing to marketing quotas to export regulations to providing various inputs at subsidized prices. In most cases, BDG actions have distorted the prices of products and inputs, and, thus, investment and resources have been misallocated. Input subsidies have generally discouraged efficiency of resource use, deep tubewells being, perhaps, the most glaring example. Product price regulations also have discriminated against the agricultural sector and discouraged investments in improved

technologies in the face of reduced prices. While progress has been made, some distortions remain.

The argument presented here is not one of complete reliance on marketing forces as a solution to Bangladesh's problems. Rather, there is a need for more balance between the private and public sectors so that the forces of free markets can be harnessed to promote the total developmental effort. In some cases, markets can fail. Both monopoly and monopsony elements can arise if market processes and structures are not guarded by the government. The potential for abuse is especially high if the number of market participants is limited and contacts are restricted by travel or other communication deficiencies. Bangladesh has had its examples of suspected market manipulations, e.g., hoarding by limited numbers of foodgrain dealers. Several areas have been identified in the assessment where public intervention is desirable, if not mandatory, but where BDG involvement is deficient. Free markets, however, assisted (not styled) by the government can be an effective means for allocating private investments and reducing the burden on government. Even so, government must remain sufficiently involved and enlightened to impose public responsibility on private prerogative where advisable.

Bangladesh's allocative system has been characterized by inappropriate governmental involvement on the one hand and inadequate support on the other. The BDG has intervened in areas where intrusion is, in fact, distortive, such as sugar and jute processing and marketing. Conversely, it has not assumed its rightful role and responsibility in other areas such as setting and enforcing standards for product quality and grade.

In some important measure, inappropriate BDG market interventions arise from a philosphy which has seen subsidy and below market pricing as an aid to the poorer segment of the population. The food rationing system and credit programs are examples. The plight of the poor segments of the populations must be recognized, and they obviously have to be helped. In almost all cases, the dilemma of the poor should be treated as a welfare issue and should not be permitted to interrupt and misdirect the legitimate operation of viable markets or commercial institutions.

Interventions by the BDG in the factor markets of Bangladesh also have limited their effectiveness. For example, despite a substantial increase in fertilizer use over the last decade, the system still suffers from inadequate storage, and supplies have been unavailable at critical times.[2] The distribution of modern irrigation technologies has likewise suffered from inefficiencies inherent in public management on the part of BADC. Both of these factor markets are being moved toward greater private sector involvement, but there is still substantial public sector intervention.

Credit markets still rely on a low interest rate philosophy. By setting interest rates low to permit the poorer farmers access to credit, the financial institutions are rendered almost totally insolvent. At low interest rates, the value of credit is distorted, private savings for future lending are not generated, lending costs exceed revenues, and the institution must rely on continuing BDG and donor subsidies to remain operational.

Land exchanges are fairly free, but the registration process and the system for resolving disputes are laborious and discourage legal transfers. Labor markets are totally free, but there is only minimal evidence of an employment assistance infrastructure. Most job information is passed by word of mouth.

Water markets have been left free and appear to be evolving without interference. But water represents one area where enlightened BDG intervention may serve long-run developmental objectives. Currently, shallow and deep tubewells are being installed with no guarantee of water rights. Such a system is likely to function with a minimal amount of disruption so long as the supply of water is sufficient to avoid jurisdictional disputes. But water will become scarce in given regions, and an increasing need to arbitrate water rights will arise. In fact, disputes over competing uses of water have already been reported. A national resource plan and legislation could address these and related issues. However, care should be taken to insure that interventions are not disruptive. Regulations should promote and not stifle the present momentum in adopting irrigation technology.

A final area of BDG intervention is the extensive operation of public corporations and autonomous public agencies. Much of this intervention was thrust on the BDG out of necessity following independence. It also grew out of a political philosophy of centralized control. But, regardless, the experience has proven detrimental to agricultural development. Huge losses, which must be covered by public subsidies, have occurred for most years since BDG nationalization in 1972. Efforts of these corporations and agencies have failed to build programs or facilities which promote agricultural development. Equally important has been the failure to provide secure, expanding markets for producers of locally produced raw materials. Secure markets are often as important to producers as price. For example, the model whereby growers are given advance contracts to produce raw materials for selected agroindustrial processing, such as the system used by the Bangladesh Tobacco Corporation, offers a proven means of disseminating both credit and extension assistance and minimizing risk associated with widely fluctuating prices. This approach has not been practiced widely in Bangladesh. Possibly, private sector management in some of these areas can be more successful in not only eliminating the BDG subsidy obligations, but also in supplying the needed developmental catalyst.

Limited Market Infrastructure and Regulation

Both product and factor markets suffer from an absence of essential public services which would generally contribute to improved market efficiency and which normally must be provided by government.

The transportation and communications network is not adequate to permit the prompt and orderly flow of goods, services, and information. The market news service needs improvement, although price reports on some commodities are made by daily news media. There is practically no BDG attention to product grades and quality standards. Likewise, BDG efforts to guarantee competitive markets are, in reality, only price surveillance activities. This is due to the large number of markets and limited budget support. This activity will need to be supplemented if greater reliance is to be given to market forces. Finally, the system of weights and measures lacks standardization. Regional and product differences in volume, weight, and area measures are apparent. The adoption of the metric system in 1982 will take time to be effective and require considerable effort if it is to impact positively on the current system.

These deficiencies constrain the efficiency of agricultural markets in Bangladesh. Transport is delayed, exchanges are made more costly, and informational flows are retricted. Each has its impact on relative costs and prices. Both long-run investment decisions and annual cropping patterns are being distorted by these inadequacies. It is interesting to note that the BDG, which has intervened in so many aspects of the market system, has failed to recognize and assume its legitimate role in the areas cited.

Inadequate Physical Infrastructure

Developmental efforts in Bangladesh suffer considerably from an insufficient physical infrastructure. The north-south drainage and the exceptionally large rivers create extremely difficult problems for road construction and river crossings. When coupled with the narrowness of the roads, in part dictated by the limited land base, the constraints to providing more rapid and efficient transport are all too clear. The impact of these conditions on farm-to-market roads are especially debilitating and restrict the cropping options to less perishable and lower valued crops where transport limitations are particularly severe.

Rail transport suffers from much the same disorders but is further constrained by old rolling stock and inefficient scheduling and management. Water transport appears to operate with greater efficiency than other forms despite the appearance of the opposite. The large numbers of human-powered boats are, in reality, the backbone of the nation's transport system.

Additionally, the electrical power infrastructure is not yet reliable or sufficiently distributed to totally service the developmental needs in agriculture or those associated with rural and other industrial development.

Since virtually all of Bangladesh's territory has been opened to settlement, the role of infrastructural improvement is focused almost entirely on facilitating the marketing process through the efficient transport of goods and people plus providing essential inputs (such as electricity and energy) for job producing industries in both rural and urban centers. Infrastructural improvements have been made and others are in process. Yet, at this point in the nation's progress, inadequate physical infrastructure remains a constraint which requires continual attention. Adequate physical infrastructure is a necessary, condition for developmental progress. There are too many ıspects of the change process which cannot go forward without adequate infrastructure. Transportation, communications, rural electrification, and water development are among the items which must be adequately placed if the impact of other program investment is to be fully realized.

In the case of Bangladesh, there are several types of BDG interventions which necessitate attention to policy impacts and underlying philosophy much the same as previously discussed for marketing. Several forms of transport entail both public and private sector investment with attendant policy issues of regulation, licensing, taxation, and pricing. Also, the very basic question of BDG participation in some forms of transport requires analysis and decision. In 1982-83, for example, four of the five transport entities operated by the BDG suffered substantial losses which had to be absorbed by the government. Distortions in the allocative processes are possible with all of these initiatives just as they are with other factor and product market outcomes discussed earlier in the assessment.

Unchecked Population Growth

Bangladesh possesses one of the world's most urgent developmental problems by virtue of the extreme pressures placed on the nation's land base and other productive resources by a very large (90 million) and rapidly growing (2.5 percent annually) population. This results in an additional 2.3 million mouths to feed each year with a doubling of the population in about twenty-eight years. Already, the effects are being felt with large numbers of unemployed and landless, substandard nutritional levels, and a constant awareness that the margins for increasing food output are very fragile.

Agriculture's performance becomes critical in the face of such population pressure and the required achievement by the sector is substantially greater than normally expected in many LDCs. Bangladesh cannot meet the future food needs of its people

with anything less than a superior performance by the agricultural sector.

Based on worldwide as well as regional precedents, the prospects for significantly limiting population growth and, thus, reducing the growing demands on the agricultural sector are not encouraging, at least in the near term. The family planning program in Bangladesh shows signs of some impact. Prevalency use rates of birth control measures were reportedly at about 18.6 percent in 1981 as compared to 7.7 percent in 1975. Of that group, 10.9 percent were using modern methods.[3] The prevalency rate is considerably short of a realistically attainable target rate of 38 percent which would lower the population growth rate to about 1.5 percent.[4] Results of recent years are positive, but still the problem of containing population growth is monumental. The several factors of rural life which encourage large families, such as supplying farm labor and providing economic security for parents when they are old, operate very strongly in Bangladesh.[5]

Population level and growth, however, are not direct constraints on agricultural production. Rather, the impediments arise via the competition for land and public investment resources which accompany high rates of population growth. People live on land, and rising population means more demand for homes and related uses. To the extent these cannot be met with noncroplands, productive cropland is invaded.

Of even greater significance to agriculture's productivity and future is the fragmentation of landholdings which population pressures have brought to Bangladesh. Lands are continually subdivided, and the sector is now composed of large numbers of small holdings. In a labor surplus country, small labor-intensive holdings are not necessarily detrimental. But, excessive subdivision can lead to uneconomical farm sizes and create other ownership patterns which do not generate the highest intensity of land use. At some point, small units usually become unprofitable, and owners must sell their land in the face of economic adversity and pressures and join the growing list of landless. This has been the history of Bangladesh. The situation has become politically less and less acceptable as population continues to increase. To the extent that ownership status or rental arrangements for these lands have restrained agricultural output, the outcome of the population pressures have been detrimental.

Aside from the impact on land use, population pressures constrain agriculture by utilizing funds which might otherwise be devoted to agriculture or other sector programs. In Bangladesh this is no small item. Family planning programs absorb some of the largest quantities of both BDG and donor funds and, in essence, produce no productive goods or services of consequence to agricultural growth and development. The prospects are that agriculture will continue to compete with population programs for public support for some time to come.

Present population control methods are having an impact on the number of births. Increasing the availability of birth control methods to fill the latent demand can be effective to a point. But the long-run stability of population growth obviously the basic issue, and it is unlikely that the underlying forces which endorse large families will be arrested to the degree necessary until somehow education, health, employment, and the social status for women are improved appreciably for large numbers of the populace. Furthermore, the distribution of population is towards the younger age groups. As these groups enter the childbearing years, population pressures will escalate considerably with serious implications for the performance of agriculture.

There are limits to the extent to which agricultural production can be increased, especially in the next five to ten years. It is incumbent that population growth be controlled if agricultural progress is to bring improved per capita welfare to Bangladesh.

Limited Mobilization of Domestic Resources

Bangladesh exhibits extreme dependence on donor assistance due to the large financial needs to carry the burden of public programs and limited efforts to mobilize domestic resources. The need to generate large amounts of domestic resources is extremely important, both to the national economy and to agriculture. The inability of the BDG to provide local financing has restricted disbursements of donor project funds. In addition, domestic savings have been estimated to be negative since independence, which means that donor assistance also has been utilized to underwrite publically financed consumption[6] at the expense of critically needed public investment. Any increases in investment, therefore, increases Bangladesh's dependence on foreign assistance. The picture is made even more grim by the reliance on proceeds from the sale of donated food to finance portions of the present BDG budgetary structure. To the extent Bangladesh accomplishes food self-sufficiency, this source of funding would require replacement which is a perverse "built-in" disincentive to improving agricultural productivity.

Some would doubt whether the economy has the capacity to produce a cumulative surplus of food and fiber above the consumptive needs of the people which could be mobilized through taxation, savings, or by other mechanisms. The low per capita incomes, the large number of landless and disadvantaged, and the recent performance of agriculture are conditions which reinforce this assertion. Because the sector has not yet generated an overall surplus, attempts to extract resources from agriculture to fuel development of the nonfarm sector could be counter-productive.

Experience suggests, however, that resources can be mobilized within agriculture for investment in the sector without encountering negative results. For example, savings have been almost totally ignored as a vehicle of domestic resource mobilization. The USAID experimental credit program, fertilizer sales, and purchase of shallow tubewells are evidence that some rural residents do have liquidity that can be mobilized for operating capital, investment, or savings. A credit study in Peru corroborates the Bangladesh results and adds credence to the general concept.[7] These cases demonstrate that there is demand for agricultural credit at higher interest rates than are currently offered through official governmentally controlled institutions, and that some private resources can be mobilized within agriculture. Instead of mobilizing existing liquidity in the sector, past policies of the BDG have increased the subsidy burden and donor dependence.

Savings, as a means of capital formation, would permit agriculture to contribute more fully to the developmental process without premature decapitalization of the sector as is often the case with various forms of taxation or other devices for extracting resources from agriculture. Mobilized funds and lender interest payments remain generally with rural people. Interest earnings can become a form of nonagricultural income for rural savers. Furthermore, the savings and investment processes will be strengthened as liquidity increases with rising agricultural output. Once created, the structure provides a continuing management alternative for funds to be used as farm investment (such as a tubewell), for current expenses (such as fertilizer), or as interest-bearing savings. In fact, the focus on private savings as a source of capital formulation is a desirable feature which not only reduces the burden of the BDG but also sets the price of credit at a level which more closely approximates its value in production.

Deficient Export Base

The trade imbalance in Bangladesh is a critical problem. Failure to balance imports and exports in some reasonable degree has placed considerable stress on the economy and has constrained the agricultural sector.

The trade problems are primarily the outgrowth of deficient exports. All nations must import to develop and survive. Bangladesh is no exception. Furthermore, the level of total imports into Bangladesh are not excessive by standards of other LDCs, despite the fact that Bangladesh relies heavily on imports of raw materials to support some processing industries, such as textiles and petroleum, plus foodgrains to fill annual production shortfalls.

The problem is that Bangladesh has not developed adequate exports to pay for even minimal import needs. As a result, one

import item, petroleum, represents about 75 percent of the total value of all exports. Agriculture has provided most of the export earnings, primarily from jute and jute products. Tea, animal skins, and shrimp have contributed marginally. Reliance on agriculture has created an extremely narrow export base, which is highly vulnerable to both weather and fluctuations in world markets. Furthermore, research and other development efforts related to jute improvement have been marginal despite jute's importance to export trade and the extremely high labor intensity associated with its production. Some of the largest losses of public corporation have been recorded by the jute industries. A one-crop export base is not a reliable foundation upon which to construct a developmental effort.

The BDG has not developed sufficient nonagricultural export options. Only limited advances have occurred since 1972 in building industrial or commercial exports to utilize the abundant labor supply. The Wage Earner's Scheme is one meaningful attempt, although it has allowed large numbers of skilled people to leave the country when skills are a critical domestic need. Aside from agriculture, Bangladesh's major export resource is labor. More accurately, it is the product of labor that is available for export. The huge labor supplies should give Bangladesh a comparative advantage in several assembly type, industrial ventures which are highly labor intensive. The experience of Taiwan, Korea, and Hong Kong are examples of countries where private sector investment has taken advantage of the relatively low wage rates and a large supply of labor to establish profitable enterprises. These steps have not occurred sufficiently in Bangladesh. Two reasons are plausible. First, labor skills may not be adequate, but it is highly probable that training of Bangladeshis would be no more difficult than was the training of nationals in the early stages of development for other nations. Secondly, BDG regulations and political instability have created an undesirable atmosphere for both domestic and foreign investors. A study of the laws and regulations governing private and foreign investment were not possible during this assessment. It is likely, however, that such a study along with interviews with prospective foreign investors would confirm a high risk investment climate.

The failure to develop labor-based exports has seriously limited the foreign exchange earnings for Bangladesh, has helped perpetrate the narrow export base, and has retarded the upward mobility of labor. As a consequence, the economic structure for labor's movement from agriculture is not in place; but, more importantly, has been left the responsibility to agriculture to employ the labor. Unemployment and underemployment in rural areas are significant, but food for work projects have, fortuitously, provided some relief. Even within agriculture, the productivity of the employed has likely been forced downward by the large labor force and the lack of incentives to invest in even minimal

technologies which would increase its marginal productivity (investments in fertilizer, irrigation technology, and HYVs being an exception). Wage rates have, thus, remained fairly stable, with minimal increases being tied more to inflation than to changes in productivity. The total scenario is one of economic stagnation and restrictions on the levels of effective demand for a vast segment of the rural popuation.

But perhaps the most important consequence to agriculture of the inadequate export base is the concomitant restrictions on critical agricultural imports. Bangladesh already depends on imports to supply raw materials to its textile factories and provide strategic inputs such as fertilizer. Even if some of the import requirements are reduced by domestic production of urea fertilizer and natural gas, the total import needs for agriculture can only be tempered not eliminated. The pressures on the export base will likely grow more intense as demands for capital and intermediate goods, and consumer items increase and compete for scarce foreign exchange which will be needed by agriculture. It is evident that export development must occur if Bangladesh is to escape its current constraints. Next to the fundamental need to augment agricultural output and productivity, the creation of an export base is perhaps a vital second priority in a developmental strategy. Of course, both priorities are made more attainable if there are adequate levels of human capital to support these efforts.

Inadequate Farm Power

The agricultural sector has inadequate power. Irrigation utilizes some electrical and diesel energy and traditional sources such as cowdung, rice straw, and wood are used for home cooking. But, the unfavorable distribution of draft power is a major constraint to agricultural production. Animal availability is only marginally adequate principally because ownership of animals is concentrated among larger landowners. The quality and stamina of draft animals also are very poor. Additionally, nutrition is low as animals live almost entirely on the by-products of crops grown for human consumption. Diseases, particularly parasites, reduce energy levels. In total, the entire management system for producing animal power for farm use is a secondary effort within the sector. Limitations in resource availability and management knowledge have simply defined a lesser consequence to animal production and maintenance, despite the obvious importance of power to the farm production process.

As a result, the sector output is constrained by inadequate draft power. The situation is extreme for meeting seasonal needs. The recommended six plowings, for example, normally required for about twelve million acres from early March to mid-April is not possible with the current number and distribution of

draft animals (approximately ten million). As a consequence, some land is being prepared at less than the optimal levels.

The implications of the present inadequacies are alarming when projected to scenarios of future increases in intensity of land use and output. Timely land preparation is a critical element in multiple crop rotation systems which feature highly intensive land utilization. Unless crops are seeded in time, the production sequence is interrupted and one of the multiple crops may not be possible. Irrigation can expand the critical time belt when the need for land preparation is determined by moisture availability. But, even with irrigation, the flexibility of planting times has limits, and draft power remains a critical component of the farming sequence.

Some increase in animal numbers and quality is needed if draft power is to be adequate. The current prospects are not encouraging since such expansion in numbers requires a concurrent expansion in the animal feed base. Many of the feeds used for animals are competitive with household use. Furthermore, expansion of HYV production will reportedly reduce total straw output as compared to local varieties.

Intensifying land use will be extremely difficult under these constraints, and it is not clear that increased productivity from more intensive land use can be realized without added draft power. With a limited land base, increases in animal feed will have to compete with land usage for human food, except in some cases where roadsides, railroad right-of-ways, and similar types of land can be used. The more realistic potential for augmenting the animal feed base is on lands which become available by adoption of improved technology for various crops, especially in the dry season. For example, with successful introductions of new technology, more rice production should be possible on less land. This concept becomes relevant, of course, only after total rice production reaches the level of filling national needs. Meeting the increasing draft power requirements of agriculture depends on research and new technology and the far-reaching effects both can have on the developmental process.

The extensive expansion of tubewells and surface irrigation present another energy requirement for agriculture. Expansion of the number of wells needed to modernize the sector will greatly increase energy demands and intensify the issue of electricity versus diesel as economical power sources. Electricity is used only minimally at present but may offer better potential as rural electrification is extended. There is some feeling that electrical energy produces more pumping capacity than diesel, despite the frequency of breakdowns in the system. The alternative of simplified, human-powered pumping technology to lift water from such shallow depths should not be ignored, although it is mostly applicable on very small plots. Any technology which features labor intensity deserves close study in a labor surplus nation like Bangladesh. It should be recognized,

however, that deep and shallow tubewells may reduce the water table and render hand pumps infeasible.

A related issue is the supply of energy for industrial development. Both rural and urban industrial expansion are important to the total development process.

The total energy base of Bangladesh is marginal and must be made more reliable and adequate. Progress is being made with both electricity and gas. Rural electrification is proceeding, the east-west interconnector is completed, and an atomic-powered electric plant was recently proposed as a new type of energy base, but the idea has not yet been seriously advanced.

Inefficient Public Services

The system of public services and institutions serving agriculture is often ineffective in meeting the needs of agriculture. There is a significant amount of proliferation and overlapping jurisdictions and duplications, and internal coordination is not adequate. But perhaps of most importance is the laborious administrative procedures in almost every part of the public sector which give rise to "red tape," corruption, and generally inefficient processing of the needs of individuals who must confront the system. Transactional costs are extremely high for almost all governmental functions. Individual initiatives are discouraged by complicated, time-consuming, bureaucratic procedures, and requirements. The recent reorganization of many ministries portends an improvement in organizational efficiency, but a concomitant betterment of operational procedures is yet to be realized.

An important segment of the public services system which impacts on agriculture interfaces with the foreign donor community and provides the administrative mechanism for utilizing both domestic and donor assistance. The system operates, in most part, better than in many LDCs. Yet, the total coordination effort still lacks completeness. Furthermore, the scope and magnitude of the programming load literally overwhelms the capacity of the BDG. Delays and duplications, plus the problems of wasteful investment and the rule of expediency, are heightened by the pressures put on the system. Much of the pressure is caused by the need to satisfy the hetrogeneity of donor views and philosophy.

Limited Data Base and Policy Analysis

The available data base is deficient to support the programming needs of the agricultural sector. The statistical system which provides the basic data does not generate adequate sets of data on a spatial or time series basis. Household expenditures, employment breakdowns, income and price elasticities, data for forecasting production, factor use, and

farm level price have been identified as areas of serious deficiency.

In addition, the BDG has not established a complementary capability for policy analysis to help guide the total developmental effort, despite the wide range of BDG market interventions and far-reaching policy decisions which have had extremely important impacts on the sector and economy. This is not to suggest that policy decisions by the BDG have been made in a vacuum. Bangladesh has some well-trained scientists who have been doing policy studies for BDG agencies. However, the policy analysis process is poorly integrated into BDG planning, in part, due to the deficiencies of the data base, and the results of the analysis do not always influence the direction of programs. The function is treated more on an ad hoc basis than is desirable for a nation where public policy is so critical and the outcome so important to the advancement of agriculture. So many of the disincentives and distortions which have been cited in this assessment are a product of improper policies.

Status of Women

The status of women in Bangladesh and their role in agriculture does not fit suitably within the set of constraints to agricultural development. Rather, the status of women is more appropriately viewed as a structural element which cuts across most, if not all, of the constraints identified in this assessment. The limited mobility and related restrictions placed on women in rural areas have defined a fairly rigid system of tasks which is focused totally on the household and homestead, and the welfare of the family is closely tied to both consumption and production levels within these units. Furthermore, the system has discriminated against women acquiring some of the elemental skills and knowledge which would extend their individual options and make it possible for them to contribute more to improved output of the homestead unit. The system has also limited the alternatives for women in nonagricultural development and political participation. Whether these or other status modes associated with women's roles become meaningful constraints to agricultural development depends mostly upon the degree to which they are evaded in developmental programming and are allowed to function at cross purposes with project objectives. The most obvious way to guard against this hazard is to recognize and understand the basic elements of the role structure for women so that the potential impacts of existing status arrangements can be addressed. This approach is much more desirable than a strategy which insists on radical alterations in general attitudes and the social structure to negate status issues, since neither would be relevant or productive preconditions for developmental assistance in Bangladesh.

While there is a fairly large informational base on women's roles in Bangladesh, it is mainly descriptive and does not provide much in the way of analytical evidence to quantify the influence women's status has on agricultural production. Most are indirect indicators such as the qualitative inferences about women engaged in horticultural production who are not targeted by research and extension programs to receive the latest technology; or equally, the impact that low attainment of formal education has had on family planning or fertility. Still, this informational base provides reasonably good descriptive detail on the general scheme of women's relationships to agricultural processes and their related responsibilities within the home and homestead. The understanding of these structures is sufficient to permit good project planning and management and avoid many of the pitfalls which can transform elements of women's status, which may not otherwise be consequential, into actual constraints when impacted by assistance projects.

It is not clear, however, that the present knowledge base is adequate to define project interventions designed only to address women's issues. As a matter of philosophy, it also is not clear that such single vectored interventions are desirable. Rather, the available information is sufficient to assist in identifying areas of women's concern and welfare which can be incorporated as components within broader developmental topics and projects. This programmatic approach can add materially to the project impact in agriculture and provide a much needed impetus to the development of women's economic options both within and outside the sector. For example, opportunities to develop women as credit officers or as bank tellers within an agricultural credit project might be appropriate as might the introduction of new vegetable varieties for rural homesteads as part of an agricultural research project. Within this programmatic focus, there are numerous options for addressing the needs and economic status of women in rural Bangladesh while meeting the program requirements of a general developmental strategy.

Status of Land Tenure

Output from the agricultural sector has been and continues to be influenced considerably by the status of the land tenure system. A primary impact comes from the large number of farm owners found in Bangladesh. In 1978, the number of households which actually owned farmland (not including homesteads) approximated 8.5 million (Table 2.6, Chapter 2). The presence of such large numbers impedes the introduction of new production-oriented programs by making outreach efforts much more difficult and less effective. Contacts are considerably limited and the impact of success with an individual is reduced significantly by comparison with larger farmers. The situation is exacerbated in Bangladesh by the continual subdivision of lands among heirs

which intensifies the pressures toward smaller sizes. Unfortunately, farm size eventually becomes so small as to be rendered uneconomic and incapable of withstanding economic stress. These lands are often sold. The dynamics of the total system, however, does not appear to have appreciably altered the typical distribution of and over time. Additionally, the productivity of land in Bangladesh is influenced by geographic fragmentation. It is not uncommon for a farmer with two acres, for example, to have his holdings scattered in as many as ten parcels at considerable distances from his home. Management efficiency is reduced, time costs are increased, and the capacity to invest, particularly in small capital items such as irrigation technology, is limited by the heavy fragmentation. At the same time, however, fragmentation offers a means of spreading the farmer's risk by providing geographical diversification.

The pattern of ownership also leads to management conditions which impact on farm productivity. Small farmers tend to farm their own land and to utilize fertilizer (when economically able) much more intensely than larger landowners, but they are less able to carry the burden of capital investments. Large owners tend to lease more land and the leasing arrangements are an important part of the land tenure scenario. About 24 percent of Bangladesh's cropland is leased under arrangements ranging from cash rental to sharecropping. But most leases are sharecrop which creates minimal incentives for the leasee to invest in output-increasing modern technology.

The composite impact of the tenure system on agricultural output is mixed and is difficult to measure. Obviously, trade offs exist between the existing tenure structure and alternative scenarios which might, for example, increase the number of small landowners at the expense of large owners or alter the traditional leasing arrangements to discourage sharecropping or more evenly spread input costs between tenants and owners. Impacts would occur and perhaps marginal net gains could result which would argue for BDG intervention. But the aggregate impacts (both benefits and costs) are unclear. Despite the potentials associated with tenure alternations, there is no convincing evidence that well-conceived developmental strategies, and projects cannot be successfully implemented under the present tenure system structure.

Pressures exist in Bangladesh for changing the present tenure system, mostly as a response to the issue of finding income-producing alternatives for the 3.5 million landless families. Redistribution of the larger landholdings is seen as one solution to the plight of this group, and justifications are based on the assumed increases in agricultural output which would occur as small farmers utilize the land at higher levels of intensity. The issues have been widely discussed, but it is beyond the scope of this assessment to attempt an analysis of the multifarious elements related to land redistribution. A few concluding

observations will constitute our contribution to the discussions. First, the issue of the landless seems best viewed as a welfare concern demanding a welfare solution. Despite the conventional knowledge that wealth and power in Bangladesh originate with the land, this need not be so and likely will not be so in future years as development occurs and people find more and more opportunity to gain productive employment outside of agriculture. The fundamental dynamics of economic development has surplus labor exiting from agriculture for employment in the nonagricultural sector. The landless represent these mobile labor resources which could move readily to nonagricultural employment if given an opportunity and skills to meet the needs. The solution to the landless issue is most likely to be found in developing nonfarm options and facilitating labor's ability to move out of agriculture rather than in changing the present tenure structure.

Secondly, if clear advances in agricultural output are possible by manipulating either ownership patterns or leasing arrangements, they should be pursued on their own merit and not as a solution for a welfare matter. Care should be taken to insure that the basic causal factors, farm size, and leasing arrangemets are resolved and not merely redisigned as would be the case with land redistribution. For example, farms become too small because of the inheritance process. Establishing minimum, not maximum, farm sizes is a more rational solution to the problems of small farm size. Likewise, prohibiting sharecrop leases in favor of cash rentals is a direct solution to the leasing issue. Cash rentals entail conditions which give incentive to investing in new technology. But the overall question is whether or not a workable BDG intervention can be devised to make either these or other solutions administratively workable. To be effective, the changes must be implemented universally in Bangladesh and this requires an administrative, political, and institutional capacity that may not be in place. If not, changes may simply incorporate concepts which are administratively unenforceable.

Footnotes

[1]Yujiro Hayami, and Vernon W. Ruttan, Agricultural Development, An International Perspective (Baltimore: the Johns Hopkins Press, 1971).

[2]Fertilizer use has declined slightly during the past two years due to inadequate rainfall, but is still substantially above the levels of use in the early 1970s.

[3]Ministry of Health and Population Control Bangladesh Contraceptive Prevalence Survey - 1981 , Management Information System Unit, Dhaka, December, 1981, p. 84.

[4]This assumes a crude birth rate of 32 per thousand and a crude death rate of 17 per thousand. To reduce population growth to zero at the assumed death rate of 17 percent, the prevalency rate would have to rise to about 68 percent. Estimates provided by the Population, Health, and Welfare section, USAID, Dhaka.

[5]For a description of these factors see: John W. Mellor, The Economics of Agricultural Development, (Ithaca, New York: Cornell University Press, 1966).

[6]World Bank. "Bangladesh: Report on Domestic Financial Resource Mobilization," Report No. 1919-BD, April 26, 1978.

[7]Robert C. Vogoel, "Savings Mobilization: The Forgotten Half of Rural Finance," Discussion Paper No. 6, Colloquium on Rural Finance, World Bank, Washington, September, 1981.

CHAPTER 10
MODERNIZING AGRICULTURE

"Indeed, we should be a leader among all the donors in using science and technology as the most basic vehicle for change. That our business is the creation and transfer of productive ideas should permeate each of our projects, in every sector and every region . . . I see AID's role as essentially an 'intellectual ventured capital' operation."

M. Peter McPherson
Administrator, USAID

Introduction

A modern productive agriculture for Bangladesh and improved welfare for its people are attainable. However, serious constraints must be overcome. Fortunately, there is a rather widespread consensus on what needs to be done to address these obstacles based on years of developmental experience worldwide and systematic study of the developmental process in agriculture.

A very fundamental portion of the challenge of development in Bangladesh is the challenge to the political and popular will of the nation. Success will be determined in large measure by the extent to which the BDG can implement appropriate programs and policies and forge a system and commitment with nationwide support that is sustainable beyond the turn of the century. Agriculture should be viewed in the broader context of its integral role in the overall economy and accorded a priority by the BDG as a principal source from which overall development can emanate. The shift to this philosophy will have to be more than rhetorical, and the philosophy must pervade all aspects of the developmental effort. The nation needs to accept greater responsibility for its future and play a stronger role in generating the prerequisite resources for development.

A long-term commitment from the foreign donor community also will be a principal prerequisite if their assistance is to help sustain growth and development. The effort will be most beneficial if donors establish a more logical division of support to assure greater efficiency in the use of scarce developmental resources.

This chapter presents a framework for organizing and focusing an effort to modernize agriculture in Bangladesh. The first section presents a brief discussion of the role of agricultural growth in the total developmental process, while the second sets forth the conceptual approach for achieving agricultural development which has been implicit throughout the assessment. The third section describes the elements of a strategy for developing agriculture in Bangladesh which are derived from the overall conceptual approach and the assessment. The final section discusses AID's current program and presents priorities for interim program adjustments and for future programming.

Agriculture and Economic Development

Sustained increases in the productivity of resources used in the agricultural production process--land, labor, and capital--result in increased output with attendant downward pressure on the prices of agricultural products and a tendency for the internal terms of trade to move against the agricultural sector. Rising agricultural productivity and the subsequent decline of the relative price of agricultural products sets into motion a series of interrelated events and changes which collectively are referred to as the generation of an agricultural surplus.

The agricultural surplus is comprised of several components all of which contribute to growth and development in the general economy.[1] First, labor and other resources tend to become more valuable in nonfarm employment and begin to flow out of the agricultural sector. The surplus labor and other resources are released from agriculture by the falling relative prices of agricultural products to be employed in more remunerative pursuits outside the sector. However, careful attention must be paid to skill levels of rural people if laborers released from agriculture are to find employment in the production of non-agricultural goods and services.

The second element of the surplus comprises increases in real incomes, which are generally realized by all consumers of food. Since the demand for food tends to be price inelastic (there are few substitutes for food), the share of income expended for food declines as prices fall. The savings realized from declining food prices augments the real income of consumers. In Bangladesh and other poor countries, the improvement in real income can be substantial since food is the most important wage good for the majority of consumers and dominates the budgets of most rural and urban poor.[2] The increased real income results in more demand for wage and investment goods produced in the nonfarm sector and for agricultural products with higher income elasticities of demand. This results in growth and development of those sectors with ensuing multiplier effects throughout the economy.

A third element of the surplus is a tendency to shift the distribution of income in favor of the relatively poor. This occurs because lower income people tend to spend a higher proportion of their income for food. So falling prices of food tend to increase their real incomes relatively more than more well-to-do consumers.

A fourth element of the surplus is a tendency for the nutritional status of consumers to improve. This is most likely to happen among the poorer consumers who gain access to goods with urgently needed nutrients (such as vitamins A and C) that were previously too expensive. Increases in productivity also can be expected from better nutrition and related improved health.

Finally, at lower prices, products of the agricultural sector become more competitive in export markets which can strengthen and broaden the export base and result in increased earnings of foreign exchange.

The above abstraction illustrates why improved agricultural production must be looked upon as the engine of growth by the BDG in its efforts to improve the welfare of the people of Bangladesh. When the general development strategy is based on increasing agricultural productivity, the agricultural sector becomes an integral part of and the motive force for an economically efficient developmental process.

A strong historical precedent supports the premise that increases in agricultural productivity are the basis for general economic growth, even in open economies. In fact, it is difficult to find examples of nations which now occupy "developed" status which did not initially produce and then sustain requisite high levels of growth in resource productivity in agriculture, despite the wide divergence in cultures in political organizations and in the economic conditions confronting them during the period of their development. Each is unique, but each produced a growing agricultural sector. A common example, but one perhaps relatively atypical of the developing world, is that of the United States. The differences one observes between the conditions facing the United States at the beginning of its developmental process and current conditions faced by LDCs are undeniable. Nevertheless, the critical fact is that the United States was able to develop and maintain an agricultural surplus that has consistently underpinned the general economic growth of the nation. Similarly, the much publicized industrial revolution in Europe and England is often regarded as the beginning of extended economic growth for the region. Less-publicized was the significant increase in agricultural productivity that preceded and fueled the rise in industrial production. Modern day examples include Japan's rise to world economic prominence which was based initially on rising agricultural productivity. Likewise, the successes of Taiwan, Korea, and China have similar bases in agriculture that grew out

of initial circumstances not too dissimilar from those found in Bangladesh.

The emphasis on agriculture has the appearance of an "agriculture first" strategy. However, the focus should not be taken too literally. The strategy for agriculture cannot be developed in isolation from the other sectors and must be complementary to them. However, the emphasis on agriculture permits developmental options to be implemented concomitantly in other sectors which cannot be successful without first increasing agricultural productivity.

The Conceptual Approach

In the model of agricultural development which underlies this assessment, the objectives are to increase resource productivity and agricultural production through modernizing agriculture. The problem of agricultural development is to devise and follow, on a sustained basis, a path of technological change that is economically efficient.[3] In short, technological changes must free agricultural development from the constraints imposed by inelastic (relatively scarce) supplies of land or labor. If land is scarce and labor is plentiful, efficient technical changes will lead to increased productivity of land by raising its yields. This occurs as modern inputs such as HYV seed, fertilizer, and irrigation are applied to land, thus allowing increased itensity of its use. In essence, the technical change permits modern inputs to be substituted for scarce land. Technical changes which increase yields are generally biological or chemical in nature.

In contrast, labor-scarce economies must have technical changes which save labor and raise its productivity. Mechanical innovations characterize technologies (embodied in hand implements, tractors, etc.) which substitute for labor by permitting a worker to farm more land, thereby increasing the productivity of labor.

Clearly, the efficient path of technical change for Bangladesh at this point in time is to utilize its land more intensively. Bangladesh has no other realistic alternative as new lands are practically nonexistent, and the cost of bringing extremely marginal lands into production is prohibitively high. Modern agriculture must be based on biological and chemical technologies such as new crop varieties, fertilizer, irrigation, pest and weed control, and varied classes of new cultural practices. The land base cannot be expanded, its use can only be intensified if total output is to rise.

The utilization of biological technology should not be interpreted too rigidly. Some mechanical technologies also may be adopted to save land. As Hayami and Ruttan observed, "In

Japan, horse plowing was developed as a device to cultivate more deeply so as to increase yield per acre. In the United States in recent years, attempts have been made to develop crop varieties more suitable for mechanical harvesting."[4] Still, the historical direction and the economic justification of biological innovation clearly has been to augment land. It is this historical perspective which should guide the strategic focus towards biological technology in Bangladesh.

In addition to focusing on the intensification of land, a strategy based on biological technology contains a strong orientation for the utilization of rural labor.[5] Investment in yield-increasing biological technology leads to rising intensity of labor use and output per worker. To some degree, this process offsets or postpones the second generation labor difficulties. In the experience of Taiwan, increasing yields and land-use intensity from biological technology doubled the input of labor per acre and still raised the productivity per farm worker by 266 percent.[6] Both labor intensity and earnings experienced concurrent improvement with rising along with increased production. The two-pronged impact of a biological technology orientation on food production and rural labor employment make it ideal for attacking two of the most fundamental developmental issues in Bangladesh.

With the conceptual problem of agricultural development--developing and sustaining an efficient path of technical change--now more clearly defined, the more difficult question of what must be done to develop and sustain efficient technical change in agriculture is addressed.

There are five principal policy-type guidelines for developing a sustained, efficient path of technical change in Bangladesh's agriculture.[7]

First is the recognition of the fundamental role of market forces in allocating scarce resources, both public and private. In the words of Hayami and Ruttan: "The single most significant conclusion that emerges from our analysis . . . is the powerful role of economic forces in inducing both technical and institutional change . . . the pervasive role of economic forces system."[8] Market infrastructure must be strengthened, restrictive policies modified, and public interventions which distort market processes reduced and eliminated.

Second, investments must be made to produce and disseminate new technical knowledge. Usually, this will require investment in public institutions, since the resulting new technologies are often public goods and the benefits from the technology cannot be captured by private investors. There is substantial evidence that such investment in research, education, and extension institutions has yielded exceptionally high rates of return, even in comparison to private sector returns.[9]

Third, investments in human capital are critical.[10] Investments are needed in scientists and technicians to work in

research, education, extension, and related public and private sector institutions. Furthermore, the level of scientific skill needed is sophisticated because the technical problems constraining agriculture in Bangladesh, with its subtropical setting and multiple and intercropping, are extremely difficult and complex compared to those found in temperate zones.

Investments in human capital also are needed among farmers. If farmers are to have a basis for assimilating the improved technologies and communicating effectively with scientists and extension workers in the public sector, their skill levels must also be improved. Rural women who perform many tasks related to agricultural production should be an important focus of the educational effort.

Fourth, investments must take place in the production and distribution of factors of production which embody the new technologies. Usually, such investments occur in a wide range of the private sector's input supply industries for agriculture.

Fifth, the process of modernizing agriculture will require a long-term effort of several decades to develop the requisite human capital and self-sustaining institutional capacity.[11] For example, it took more than fifty years of sustained effort to successfully institutionalize the research and extension system of the United States. There have been similar experiences in other developed countries. A successful developmental outcome in Bangladesh, which already has a modest foundation of human capital and institutional competence, will require extraordinary patience and persistence on the part of the BDG and donor community in the face of increasing food deficits. But history and reason both lead to an inescapable conclusion--there is no "short cut" or "quick fix" in modernizing agriculture.

The Elements of a Strategy

Introduction

The strategy for development in Bangladesh is derived from the constraints identified in the overall assessment (Chapter 9) and the focus dictated by the conceptual formulation just presented. In brief, the strategy spotlights as its primary objective modernizing agriculture and increasing agricultural productivity through the adoption of biological technologies, the spread of which is induced in large measure by market forces and enlightened public policy.

The strategy encompasses a scientifically based agriculture and improved levels of human capital to produce the flow of new knowledge which is fundamental to the needs of the farming community. Improvements in the level of training and education of the rural masses also must be accomplished to facilitate the

spread of technology and the total developmental process. The supply of production inputs, especially fertilizer, HYVs, and water must be secured along with other complementary inputs such as credit and farm power. Critical deficiencies in public policy must be corrected to insure an effective system of infrastructure and public institutions and the incentives needed to create the proper investment atmosphere in both the agricultural and non-agricultural sectors, by both local and foreign investors.

To support the overall effort, exports must be generated to pay for the necessary imports and to assist in the generation of nonagricultural employment. The latter is an important element of the strategy. Despite the fact that an emphasis on biological technology will raise the employment intensity and the value of agricultural labor, agriculture cannot employ all of the growing rural work force. Expansion of the nonagricultural sector is a necessary complement to the strategy of modernizing agriculture. Failure to create these intersectoral linkages and to establish a demand for growing agricultural production can eventually stagnate the modernization process.

The basic focus on increasing agricultural production has implications even beyond those suggested in the conceptual model. At the present levels of low production, Bangladesh has a limited ability to achieve its social goals and, in particular, those concerned with improving the welfare levels of the lower income classes. Before concerns for income distribution can be meaningfully addressed, output levels must rise significantly. Improvements in overall welfare will be possible only if initially preceded by significant increases in agricultural output, and the potentials for this achievement should not be sacrificed by diversionary concerns for other social goals which might diminish the success quotient for agriculture.[12]

This is not an argument for complete agricultural production orthodoxy. The suggested strategy has a substantial impact on the welfare of rural and urban dwellers. For example, intensification of land use and biological innovations can lead to increased levels of employment in agriculture and at higher real wages. Increased food supplies and declining real food prices benefit all consumers. Also, increased investment in people can raise their productive capacities, increase employment alternatives, and improve income. In short, a developmental focus on increasing agricultural production has implications which are much broader than just agriculture.

The demographic situation and population pressures in Bangladesh are of particular relevance to the strategy. First, they define an urgency which requires immediate attention. Even under the most optimistic assumptions about adoption of population control measures and the ensuing reduction in population growth rates, there will be an additional forty-three million people to be fed by the year 2000.[13] These large changes

in population will intensify, increasingly, pressure on the food production system, which even now is in a deficit situation.

Second, the relatively large population and limited land base dictates that biological innovations are the "best" or "most efficient" path of technical change within the general framework for sustained growth in agriculture. In this sense, population pressure defines the strategy option, but it does not render the collective resource base incapable of producing improved levels of welfare.

Finally, Bangladesh's high population density is not unique. Many nations have a relatively large population with limited arable land. More importantly, several Asian nations have faced and overcome extreme population pressures on a limited land base and developed highly productive agricultures. For example, Taiwan had a reported 0.17 acres of cultivated land per capita in 1968, compared to about 0.25 per capita in Bangladesh at present.[14] Japan and Korea have developed modern agricultures under similar circumstances. Moreover, this has happened since World War II. The main lesson for Bangladesh is that natural resource endowments are not the principal impediments to growth and development.

A Publicly Supported Science Base

The key factor in the modernization of agriculture in Bangladesh is the establishment of a publicly supported institutional system to discover and disseminate new technical knowledge. If agricultural production and resource productivity are to be elevated, a continuing flow of new knowledge about the difficult and sophisticated agronomic and economic constraints found in the sector must be generated by researchers and transmitted to the farm populace. Development of an integrated system for doing this is the responsibility of the public sector. Neither farmers nor others in the private sector have the incentive as individuals or as units to establish this type of public capability. Significant improvements in agriculture will depend directly on improvements in the effectiveness of research and extension.

The scientific base for agriculture includes the system for disseminating new technical information. Such knowledge must be transmitted to farmers, then tested and adopted by them, if it is to be useful. The diffusion of research results cannot be left to the vagaries of an informal system, although "word-of-mouth" communications have been an important, if not major, component of the extension system in Bangladesh to date. The strategy requires a capable institutional system not only to extend research results but also to serve as a link and feedback mechanism whereby the needs and problems of farmers are communicated to the research system. The linkage between farmers and the research system is extremely important.

Bangladesh has the beginning of an effective science base, but the requisite capacity is not yet in place. The output of the research system must increase and the breadth of the system should be amplified to meet the needs of the sector. Furthermore, the linkages between researchers and the farming community should provide the flow of ideas and feedback of information characteristic of a quality system. Finally, the national research system requires continued integration into the international science network serving agriculture.

The strategy calls for the BDG to increase its financial commitment to the science base for agriculture. Priorities for additional investments need to be established and adequate resources provided by the BDG with donor assistance to develop viable self-sustaining capability. It will be very important for donors and the BDG to recognize that a commitment of decades is required.

The whole process for increasing agricultural production begins with the introduction and adoption of cost-decreasing technologies spawned by the research system. The case of wheat production in Bangladesh is an excellent demonstration of the rapidity with which change can occur and what is possible. The need is so crucial that Bangladesh cannot afford not to make the necessary investments to create a highly productive research system.

Investment in Human Capital

More than any other factor, success in achieving a modernized agriculture and high rates of economic growth in Bangladesh will be determined by its people. It is people that make land more productive. A principal element of a developmental strategy for Bangladesh must be to upgrade the educational level of its people and to base the nation's growth and future on their skills. Greatly enhanced human skills underlie each element of the agricultural strategy.

To be successful, substantially more must be invested in human capital at all levels. So many other elements of the development strategy are enhanced by improved education. Innovations become more commonplace, incomes can rise, and people's abilities to make decisions are improved. In addition, the tendency to control family size as income and education rise is of critical importance.

The scope of investment in human capital should eventually touch most sections of the society. Initially, there is a major need to train scientists to support the research, extension, and higher educational components of the science base serving agriculture and for service in public policy and administration and other components of the science base, including the private sector. Technical advisers can be employed to fill current deficiencies and to help "fine tune" the existing competence.

But this is only a stopgap measure until a sufficient number of Bangladeshis can be trained and given adequate experience.

The strategy also should emphasize elementary and secondary education in rural areas. Curricula should be adjusted and made more functional, particularly with respect to their relevance in a modern agriculture and improving health care and family planning. Some attention to adult illiteracy is needed, but the emphasis and concentration of programs should be on the younger age groups. There is a consequential interrelationship between the improvement in the level of education and the development of a modern agriculture with its more sophisticated technologies. When the research/extension system of a nation is introducing a continuous flow of new technical knowledge, the value of education rises rapidly. When technology is comparatively static, education's value diminishes. As Ruttan has observed: "In an agricultural system characterized by static technology, there are few gains to be realized from education in rural areas . . ."[15]

The resource requirements for the human capital strategy are within the capability of donors and the BDG. The increased emphasis on education may call for a new mixture of projects, but the human agent in Bangladesh must be given central attention if the nation is to realize its potential and meet the increasing food and employment needs of its people.

Modern Inputs for Agriculture

The creation of an industrial capability to produce modern inputs for agriculture is a principal ingredient in the strategy. As new technical knowledge is generated, the availability of modern inputs at profitable prices becomes increasingly important. Such inputs embody new types of technology which form the basis for increasing land and labor productivity. Furthermore, domestic production of the inputs can impact significantly on trade balances as the output of these industries displace previously imported items. Development of input industries also contributes to employment options needed to utilize the total labor force. Their greatest importance may be to guarantee the timely and sustained availability of modern inputs which are critical elements of the strategy to augment agricultural productivity.

Fertilizer, HYVs, and irrigation form a trinity of modern technology which, along with associated cultural practices, are vital to increasing agricultural output. But, of the three, irrigation is now the most limiting constraint in Bangladesh and requires immediate attention. The importance of irrigation cannot be overly stressed. Water guarantees the yield possibilities of fertilizer and HYVs. Under rainfed conditions, high risk probabilities are attached to their use which discourages adoption. With irrigation, the risks are related

primarily to the functioning of the delivery system. Furthermore, irrigation expands the potential for more intensified year-round cropping. Within the context of an agricultural strategy for Bangladesh, irrigation and water management are accorded the highest priority now that fertilizer and HYV development for major crops have been initially proven.

Still, fertilizer remains of central importance in the developmental strategy. Its timely supply must be guaranteed. Bangladesh soon should become self-sufficient in urea production. The storage system is being expanded and the new marketing scheme appears to be developing with sufficient efficiency to give high expectations for the future regarding fertilizer production and the distribution system. This effort should be pursued to a successful conclusion if the overall developmental strategy is to be affective.

Chemically produced inputs represent another important part of the strategy. The total spectrum of herbicides, insecticides, and pesticides are almost totally imported at present and utilize foreign exchange, although local capacity is developing rapidly in the private sector. Usage is still relatively low and the development of this capability has a lesser priority at the moment. But the longer run productivity of agriculture will require added chemical use to control pests, diseases, and weeds. A companion need to availability of chemicals is to insure that users have an adequate knowledge about usage and a capability for proper application. Neither are well-developed at present.

The production and distribution of HYV seeds require attention. As the research system expands and more HYVs become available there will be increased demand for improved seeds. The efficiency of seed production lends itself to the development of a viable private sector seed industry. A functioning seed industry provides the specialized knowledge required for quality production and, with proper incentive, can create a distribution system with timely delivery.

Issues of farm energy have an equally high priority in the developmental strategy. The intensification of land use demanded by the agricultural strategy will not be possible without adequate power. The available evidence indicates there are existing inadequacies, and these will become even greater as land use is intensified. The power produced by animals is likely among the most important products originating from their presence in the farm system. Farmers recognize this priority, but the research system has not provided information which sheds light on the intrafarm relationships involving animals in the production system. Furthermore, the application of small-scale mechanized technology to fill selected power needs on the farm offers a potential alternative. Both the knowledge base and developmental activities must be augmented if this crucial input is to be developed. There is little doubt that the projected future

expansion of agricultural production under the proposed strategy will require a concomitant expansion of farm power.

Modified Public Policies for Increased Market Efficiency

Utilizing and harnessing market forces to facilitate the diverse functions of the development process is basic to the strategy and is an efficient means of reducing the burden on government. The BDG has limited manpower, financial, and other resources for carrying out the total set of required tasks. It is essential that the BDG clearly define those market interventions appropriate for government which cannot be undertaken by the private sector. In general, these should focus on improving the efficiency of markets through the provision of infrastructure, guarding against market imperfections, supplying price and market outlook information, standardizing weights and measures and establishing grades and standards. Also, the BDG has the responsibility for providing education, electrification, transport, and research information systems. Most production, allocation, and distribution functions can best be left to the private sector.

It is important that the outcome of this process provide a philosophy of government which will promote the efficiency of the marketplace through surveillance and proper regulation but not by control and harassment. Markets are important to the strategy, but there is a propensity for imperfections to arise where limited entry exists. The BDG role should evolve to one of protecting both market efficiency and the public interest. This is a totally new role for the BDG that will require constant attention.

The strategy places a high premium on economic efficiency which suggests that unprofitble public corporations should not be continued. The present policy trend toward disinvestment of these units by the BDG should be continued. Political philosophy aside, the corporations are a definite financial burden on the BDG which does not have the resources to continue support for these inefficient operations. Elimination of this class of subsidy will free the government to invest funds in other more productive activities, such as supporting market infrastructure and related services and programs, instead of consuming them in ill-advised and ill-managed public enterprises. The process of transfer of public corporations to private sector ownership and management are very critical first steps in fomenting an appropriate atmosphere for encouraging the requisite private investment to expand both the export and employment bases (discussed below).

The current BDG policy with respect to widespread consumer and producer subsidies is not consistent with a development strategy which gives importance to market forces. There are obvious pressures on the BDG to provide foodgrains, fertilizer,

and credit, among others, on a highly subsidized basis. Yet the outcomes are not advantageous to the development process despite the apparent incentives and benefits. In the case of foodgrains, the impact has not been to help the needy but mainly to subsidize residents of urban areas, especially public employees, and to distort the pricing mechanisms for foodgrains which, in turn, has inhibited investments in agriculture. The very recent equating of procurement prices with ration distribution prices is an appropriate step to reduce both the subsidy and the price distortions.

In the case of fertilizers and irrigation equipment, the subsidies do not appear to be as necessary to grower usage as generally believed. The comparative position of Bangladesh's rice and urea price ratios with neighboring nations are highly favorable and increased fertilizer and pump prices can be absorbed.[16] As long as fertilizer and pumps are not priced at their market value, efficiency of use is discouraged and the subsidy must be absorbed by public funds. Of additional importance to the strategy is the fact that privatization of the marketing process cannot go forward if the BDG insists on engaging in subsidized sales in competition with the private sector, as has been the case with some types of irrigation equipment. Obviously, the private sector cannot compete with the subsidized governmental prices, which accounts for their lack of response. The limitations of the BADC as a distribution agent for these technologies should be corrected, and the involvement of the private sector is a very viable alternative within the structure of the proposed strategy.

The outcome of the USAID experimental credit project and the corroborating evidence from other LDCs suggests that pricing agricultural credit at market rates is feasible and belies the traditional reliance on subsidized rates.[17] Even within Bangladesh, a large proportion of the current credit needs of rural residents is being met by the informal credit system which operates throughout the nation. Interest rates are being paid considerably above those offered by the BDG credit institutions. The strategy for modernizing agriculture should deal directly with this issue and encourage the BDG to develop a more effective financial system to service rural needs.

Land-use policy is obviously an important element in the strategy. The problem of fragmentation and small size holding which result from continual redistribution within the family constitute a continuing debate among developmentalists in Bangladesh. Redistribution of larger landholdings to provide for the landless and to increase productivity have been repeatedly proposed as a policy solution. But it is unlikely that extensive land redistribution will eliminate the problem. The issues have been widely discussed elsewhere, but in summary they involve the following: (1) there is not sufficient land to meet the total needs of all landless; (2) the process of providing land to the

landless would also necessitate providing the means of production (and marketing); (3) it is extremely difficult to determine actual cultivators from among the groups of landless; and (4) if applied generally, the system would discriminate against widows, disabled, aged, and similar classes of needy who are presently landowners.[18]

Improved Employment Opportunities

Improved employment opportunities for rural people is an element of the strategy which is closely integrated with increasing agricultural productivity. Most agricultural developmental models incorporate these two factors in recognition of the second generation impact associated with labor as it is released from the agricultural sector. One contemporary model orients the total strategy of agricultural development to employment generation.[19]

It is highly unlikely that the agricultural sector can absorb the annual growth in the rural labor force even under the most optimistic assumptions (see Chapter 1). Therefore, it is critical that the strategy incorporate the development of non-agricultural employment opportunities and establish intersectoral linkages. In the longer run, the success of the strategy and the solution to the plight of the rural landless will be found with alternatives outside the agricultural sector. Some improvement in rural employment will be realized by a labor-intensive focus in agriculture, but a complete solution must come from nonfarm options.

Nonagricultural expansion usually occurs first in small-scale industries of the cottage, handloom type and in small consumer goods industries. These have the advantage of being less capital-intensive than larger enterprises and can often be financed by dormant rural savings.

Bangladesh has a large number and a wide variety of small industries in rural as well as urban areas. The handloom and cottage industry is extensive and has a long history to support a claim of good quality production. A USAID sponsored survey has identified upwards of 57,000 small-scale enterprises in eleven thanas which could also absorb labor with improved market and production conditions.

Larger scale, labor-intensive industries also offer a viable option for dealing with the expected magnitude of the employment problem. If private investment can be attracted, employment options can expand extensively in these industries and supplement the potential from small-scale industrial development.

The evolution of employment opportunities will be made much more efficient if the the labor market in Bangladesh is improved. Currently, support and infrastructure are almost nonexistent. Except for the Wage Earner's Scheme, only a limited formal service exists to join job seekers with employers. Strong

manpower developmental programs also are in order to train people and balance the variety of technical skills available with market demands. It is only with such training and the development of human capital that land can be replaced as the source of wealth for large segments of the society. Eventually, more and more people must share in society's economic product by virtue of their intellectual and labor skills and less from the control of land.

An Expanded Export Base

The need for an expanded export base is another element of the strategy which is interrelated with the issue of employment. It also fits into the scenario of an agriculturally led developmental strategy, since agriculture can be both an important source of export earnings and a substantial user of imported materials. Obviously, modernizing agriculture and developing nonfarm employment opportunities will be greatly enhanced by an aggressive export sector.

The development of an expanded export base is at the center of the general strategy to augment agricultural and general growth. Bangladesh's export base is drastically restricted and cannot hope to support the kind of developmental effort that is required to meet the nation's needs. There are several classes of imports which are vital to future growth such as petroleum, capital goods, and intermediate goods. Bangladesh's immediate import needs are critically related to the exports to pay for such imports. Jute and a few other agricultural products will continue to carry this burden for the foreseeable future.

Bangladesh's export base has expanded somewhat with only limited growth in nontraditional exports such as labor, assembled goods, clothing, and fisheries products. However, earlier programs and plans did not give sufficient attention to export development, particularly the kinds of activities that would create new labor-intensive domestic industries and secure markets abroad. Past efforts have relied strongly on the capability of public corporations and BDG export promotional institutions to provide both the needed supplies and markets for Bangladesh's exports. The performance of corporations has been inadequate, and the market promotion efforts have generally faltered. Furthermore, the intricate bureaucratic process has constrained private sector initiatives, both domestic and foreign.

The strategy utilized to expand the export base is very critical. Export production should be labor-intensive where possible, as in the case of agricultural technology, in order to maximize employment opportunities, capitalize on Bangladesh's likely comparative advantage, and save relatively scarce capital. Capital-intensive options may arise, particularly from private sector initiatives, and should not be discouraged if generated as a consequence of market forces. But the natural pressure should

be to utilize the advantages of the low-cost labor supply. BDG policies should be developed with this in mind. Exchange rate policies, regulatory and licensing provisions, interest rate policies, taxation, and other BDG initiatives should contribute to the employment-oriented expansion in exports. Success in meeting the challenges of export expansion requires a high degree of flexibility to take advantage of the opportunities as they arise within the strong competitive structure of international markets. Flexibility should be the hallmark of export policy to facilitate the competitive position of local exports.

Expansion of the export base and the nonfarm employment options would both benefit from establishing a sound industrial policy in Bangladesh to parallel the agricultural policy. Elements of such a policy currently exist, for example, in the import/export tariffs, private sector initiatives, and taxation system. But the policy should be more structured and clearly articulated with the view to influencing the flows of capital and labor to an emerging industrial base that will dramatically increase industrial investment with its concomittant impacts on both employment and the trade balance of Bangladesh. Extensive foreign investment is unlikely without an incisive industrial policy to guide its decisions, and the competitive position of Bangladesh will surely lag if based on an ad hoc policy climate.

Current USAID Program

The current USAID program is summarized in Table 10.1.[20] Each of the elements of the current program is discussed briefly in this section to provide a context for the recommended program adjustments and for future programming which follows.

The current program focuses on two major objectives: (1) reducing human fertility; and (2) increasing agricultural productivity. The complex interaction of sociocultural values and economic factors which affect fertility are addressed partially in the family planning services project. The project explores new social measures to reduce the economic need for children and to enhance acceptance of the small family norm, as well as ways to broaden the market for family planning services. The other components of the Mission's program are focused on increasing agricultural productivity. They seek to increase land and labor productivity through agricultural research, greater private sector participation in the supply and distribution of fertilizer and other inputs, increased access to credit, better water management, and more rational foodgrain and input marketing policies. Current projects include:

TABLE 10.1
Current USAID Program (millions of dollars)

Project	Fiscal Year 1983	1984	LOP[a]
1. Family Planning Services	24.8	26.0	113.4
2. Fertilizer Distribution[b]	5.8	--	225.1
3. Phase Two Fertilizer Distribution Improvement	--	13.0	100.0
4. P.L. 480, Title III (New Policy Directions)	60.0	60.0	--
5. Rural Finance Project	25.0	25.0	75.0
6. Agricultural Research II	6.2	4.7	25.5
7. Technical Resources	--	1.2	11.0
8. Zilla Roads Maintenance	3.0	--	9.2
9. Food for Work II (CARE)	0.7	0.7	2.7
10. P.L. 480, Title II (Food for Work Commodities)	23.5	24.9	--
11. PVO Co-Financing II	0.4	0.4	3.5
12. Rural Industries	--	1.0	5.0
13. Rural Electrification Phase II (Phase I)	10.0	5.0	40.0
14. Rural Energy Project	--	1.0	20.0
Total	**159.5**	**162.9**	

Source: Program Office, USAID, Dhaka.

[a]Planned Life of Project (LOP) funding levels.

[b]Terminates in FY 83.

Family Planning Services

The Family Planning Services project provides grant funds to governmental and nongovernmental sector population projects. A.I.D. financing for the governmental program includes participant training, commodities (contraceptives, surgical supplies, and equipment), operations research, maternal and child health training materials, contraceptive prevalence surveys, community- based family planning projects, and the local cost financing of a voluntary sterilization program. As conditions of A.I.D.'s support to the voluntary sterilization program, a national surveillance system to guarantee quality services is being established along with procedures to ensure that formal consent is strictly enforced.

Phase Two Fertilizer Distribution Improvement

The purpose of the Phase Two Fertilizer Distribution Improvement project is to increase fertilizer use through private sector distribution and marketing. The Phase One project provided fertilizer imports and improvement in distribution and storage systems to make fertilizer available to farmers on an equitable basis. The Phase One project was successfully used to implement policies which removed governmental constraints on fertilizer retailers, eliminated officially administered retail fertilizer prices, closed 249 public sector fertilizer sales centers in order to leave the local marketing function to private dealers, and implemented a private dealer credit program. The Phase Two project continues the process of transferring fertilizer distribution and marketing from public to private sector by extending the private sector's role to the national level.

P.L. 480 Title III (New Policy Directions)

The P.L. 480 Title III program provides Bangladesh with essential commodities and the opportunity for substantive policy discussions on critical issues. Past Title III agreements addressed foodgrain price supports, rationalization of the public foodgrain distribution system, and acquisition and management of grain reserves. Building on this experience, the three-year 1982 agreement provides greater commodity flexibility and moves in new policy directions. Under the agreement, the BDG has increased ration price levels above the procurement price for the first time ever. Other measures which will allow greater commercialization of the grain security system and further reduction of subsidies are being pursued. Local proceeds generated through Title III sales are directed to projects essential to progress in the agricultural sector.

Rural Finance Project

The Rural Finance project emphasizes policy reforms aimed at savings mobilization, changes in the interest rate structure, loan administration reform including better management of overdue accounts, improved collection efforts, and institutional strengthening of participating banks. It is based on the experience of an experimental predecessor project. That project experimented with nine credit models at differing interest rates using nine commercial banks. A 1982 evaluation of the experimental project revealed high demand among rural people for institutional credit, inhibited primarily by the procedural difficulties of obtaining it. Interest rates set by the project were far higher than "regular" institutional rates yet lower than those found in the informal lending markets. Another factor

which appears important to potential borrowers is the assurance that subsequent loans will be available if prior loans are repaid.

Agricultural Research II

Agricultural Research II project develops more productive crop varieties and cultivation practices by strengthening the institutional capacity necessary for these technological advances. A 1982 multidonor evaluation found that successful implementation depends upon strengthening the Bangladesh Agricultural Research Council's capacity to coordinate high quality collaborative research activities. The contract research mechanism, financed by the World Bank and A.I.D., was one way identified by the evaluation to utilize the extensive interdisciplinary network of research institutes in Bangladesh according to their resources and capabilities. The project gives direct support for rice as well as nonrice crops and has recently provided research support for on-farm water management.

Technical Resources

The Technical Resources project addresses the lack of managerial and administrative talent which is a key constraint in all sectors. The project partially meets the government's need for improved project development, management, and implementation. A special component gives management training to women.

Zilla Roads Maintenance Project

The Zilla Roads Maintenance project provides technical assistance to develop the local capacity to maintain feeder roads and provides some maintenance equipment. Of equal importance, the project seeks new ways of increasing governmental revenue-generating capability, thereby strengthening the institutional capacity of local government. The aim is to make local governments financially self-sufficient in the construction and maintenance of rural roads, thus, removing the need for central government and donor financing.

Food for Work (P.L. 480, Title II)

The management and administration of the Food for Work program is carried out under a grant to CARE while commodities are provided under P.L. 480, Title II. Along with the Zilla Roads project, the Food for Work program builds and maintains a significant portion of the national rural road inventory.

The Food for Work project also provides seasonal employment to the landless and near landless rural poor through development-

oriented projects which build roads, irrigation and drainage canals, and flood control and reclamation embankments.

A recent audit of the project found certain administrative weaknesses and recommends that the project emphasize development as opposed to relief goals. The project is now designed to reflect this emphasis with a continued focus on road building.

PVO Cofinancing

The PVO Cofinancing project supports private and voluntary activities consistent with A.I.D.'s strategy.

Rural Industries

The Rural Industries project addresses the problem of developing effective interventions to increase employment and encourage small-scale industrial growth. It provides technical assistance, credit, training, and other inputs to agencies involved in the development of private sector rural industries. Women's entrepreneurship is emphasized.

Rural Electrification Phase II

The Rural Electrification Phase II project extends the experience of a first phase project. Under the phase II project, the rural electrification distribution system is being expanded in selected areas for commerical, agricultural, and household consumption utilizing the model of rural electrification cooperatives as the base unit. Finland, the World Bank, and Kuwait are providing financing along with USAID in the construction activities. Additionally, USAID is supporting a technical assistance component for the total project which includes training for local electricians and administrative staff of the co-ops and promoting the development of appropriate electricity-based technologies for rural areas.

Rural Energy Project

USAID is designing a Rural Energy Sector project to explore ways to develop the more promising domestic conventional and nonconventional energy sources and to strengthen institutional capabilities and policies.

Recommended Assistance Program for USAID

Introduction

The extensive list of elements in the strategy for raising the level of agricultural production in Bangladesh is well beyond the scope of USAID resources, which creates the obvious need to set priorities. In so doing, several considerations should be made explicit to assist in the selection process.

First, with the large array of foreign donors in Bangladesh, it seems particularly appropriate that the Mission discriminate among activities and give primary consideration to those areas which best fit the comparative advantage of USAID and the institutional and professional resources at its disposal. Since the United States is so advanced economically, there is a tendency to see in it a reservoir of endless money, talent, and other resources which can be applied in LDCs. Its agricultural sector, educational system, technological base, and private sector are all seen in this light with varying degrees of certainty and hope as a solution for the developing world. But, like all resource situations, some are relatively more available, effective, and productive than others.

Second, the USAID Mission is one of a select group of donors in Bangladesh that attempts to operate within a structured plan. The major advantage of the plan is dissipated if its elements are not utilized in programming aid commitments. Therefore, the process of delineating options should be accomplished within the parameters of the sectorwide strategy that reflects the interrelationships of individual activities and priorities of the strategy.

Finally, time horizons assigned to implementation of assistance programs must be extended to provide an adequate span for accomplishing the full project outputs. Security of funding and commitment are indispensible to successful programming, especially where institutional building, adaptive research, education, and economic planning activities are involved. Ten years should be considered the norm in projecting program composition and commitments, with twenty-year time horizons serving to put the development process in a more realistic perspective.

All of the current development assistance projects and activities of USAID fit within the structure of the broad sector strategy discussed above for modernizing agriculture. Except for the proposed extension of the fertilizer program, which is projected through 1989, all other major activities of the Mission will terminate in or before 1985. The current Mission program could be extended without significant changes and contribute to the developmental process.

The USAID contribution, however, can be made more effective by developing a sectorwide program which incorporates new higher payoff activities more consistent with USAID's comparative advantage. This may be accomplished with additional funding or shifting resources from current programs, with marginal changes in the next few years until projects terminate and greater shifts in out years, mainly beyond 1985.

The arguments which place science in agriculture and development of human capital at the base of efforts to modernize agriculture are compelling. The historical evidence is far too persuasive to ignore, particularly in a nation where demographic pressures are persistently on a collision course with the capability of the land base to support a large and burgeoning population. The future of Bangladesh is in its people and how they manage the natural resource base. The nation's most logical chance to avoid a Malthusian solution to its people/land dilemma is to create an educated, skilled, and innovative populace. The traditional developmental orientation based on the natural resource endowment should be displaced by one which is more science-based and people-oriented, with all of the programmatic and investment alternatives implied by such a strategy.

USAID should structure its priorities and programs to fit this strategy and become its leading advocate. Acceptance of this strategy does not argue for total orthodoxy or extremism in programmatic decisions. We have already discussed the breadth of involvement inherent in such a developmental emphasis. Production inputs must still be provided, markets need to be made more efficient, nonagricultural and export options must be exploited, and public policies improved.

Development of people, however, should become the polestar from which and to which all program efforts are directed. A people focus can become the justification for all Mission programming, with food production and family planning the principal ingredients.

To implement this new orientation, six general priority areas with their accompanying program options are recommended: (1) agricultural research; (2) education and training; (3) agricultural production inputs; (4) product factor market efficiency; (5) public policy reform; and (6) employment and export market development.

Agricultural Research

USAID should focus on a primary long-term effort to strengthen the agricultural research system. The process of modernization in agriculture begins with the introduction of cost-reducing technology which is dependent on the output of a quality research system. The research embryo which now exists in Bangladesh should be brought to full maturity at the earliest possible date so that a continuing flow of quality information is

available for dissemination to Bangladeshi farmers. This will require increased levels of technical assistance, training, commodities, and equipment focused on the research priorities discussed below.

Within the present research system, selected aspects are deserving of special attention. First, water management should be given highest priority. USAID involvement in this area is just beginning under the expanded Agricultural Research II project. The effort should be carefully nurtured and strengthened. Other donors are providing capital assistance for well installations and other irrigational equipment. The missing ingredient is research (and demonstration) on the management of water, both on- and off-farm, including yield response to various levels of water and in interaction with fertilizer and HYVs. Without such basic information, resource waste is likely, and the command areas for wells will remain limited.

Furthermore, the emergence of significant water development in recent years creates the likelihood of extensive adjustments and new options in resource use by farmers. Cropping patterns can be particularly affected by the introduction of irrigation as new crops become viable and production sequences are extended to two, three, and, in some cases, four rotations annually. These new production options are extremely important to the intensification of agriculture, and farmers urgently need research guidance. As a consequence, farming systems research should continue to be encouraged as part of the broader agronomic research program, primarily as an integrating concept.

Other constraints such as soil nutrient deficiencies and insect, rodent, pest, disease, and weed control also should be given continued and extensive study along with the traditional line of cultural practices. Labor inputs are particularly important, and a continuing flow of information on labor requirements and productivity is essential as investments in labor-intensive technology are made.

Second, farm energy, and particularly animal power, should be given priority research attention. Animal power will be an increasingly critical constraint to intensifying and modernizing agriculture. The continuing emergence of this constraint is based on the increased demand for tillage and related cultural practices associated with multiple-cropping and the limited supply of animal power. Research information for both are inadequate at present.

Third, the scope of the current research system is too restricted to carry a sectorwide development strategy. The issues of animal power are, in essence, a subset of a broader problem of livestock development within the structure of the farming system found in Bangladesh. Currently, quality livestock research is virtually nonexistent, and the information flow regarding the interrelationship of animals and crops in the small farm structure is extremely limited. In fact, the current focus

of the research system is strongly oriented towards crop research, despite the existence of research facilities and institutes for animals, poultry, forestry, and fisheries. Even within the crops research, rice is dominant. If Bangladesh is to improve the nutritional quality of the diet and reduce the nations's vulnerability associated with a crop monoculture, research emphasis on nonfoodgrain crops should be intensified. The composite of USAID's support to the research system should be expanded to reflect the broader scope of important sector elements and the quality of research output improved to meet the sector's overall needs.

Fourth, jute is a critical area of crop research. A much improved flow of quality information for jute is required, especially in view of its continued importance to exports.

All of the suggested areas for research encompass expertise that is available to USAID. The Mission can reasonably accommodate such an expanded commitment, especially over an extended time horizon.

The success of the effort will depend in part on the quality of expatriate scientific skills which can be brought to Bangladesh and on the quality of formal and informal training given in Bangladesh. The present demand for U.S. agricultural scientists to work abroad is considerably in excess of the supply, especially in many of the key areas needed in Bangladesh. The Mission should give serious consideration to a formal arrangment with a qualified set of universities or other institutions in order to secure a commitment to Bangladesh and a regular supply of scientific talent to staff the needs of these and other projects in agriculture and rural development. The arrangment should be with one lead university or institution but incorporate the affiliation of two or three more in a formal cooperative arrangment based on subject matter needs.[21] The needs of Bangladesh's research system are too diverse to be handled by a single entity. The cooperative format can capture more highly skilled talent. The commitment of involved universities and institutions should be long-term with a formal Board of Regents' sanction. Those universities with Title XII Strengthening Grants and Memorandum of Understanding with USAID/Washington should be committed to devote significant portions of each to language training, faculty availability, and other activities of direct consequence to the needs of the Bangladesh program.

Aside from the subject matter issues, the absence of sufficient finances to support recurrent costs has been identified as a highly critical element in restricting the system's output. It is recommended that provisions to assist with recurrent costs of the Bangladesh research system be incorporated into all USAID research projects. Sharing in the recurrent cost needs will eliminate a critical bottleneck in the

system, and such a policy change is within the new policy guidelines of AID.[22]

Education and Training

Support of the agricultural research system and the discovery of new technologies will require additional attention to the development of human capital, not only to support the research and extension functions but also to broaden the base of literacy and improved decision-making for the rural populace. Obviously, more highly skilled scientists, administrators, policy analysts, and extension agents will be needed. To confront these issues it is recommended that:

(1) The Mission provide assistance to upgrade the programs, training, and faculty at the Bangladesh Agricultural University, The Bangladesh Agricultural College and affiliated training programs at BARI. The situation at BAU is difficult and will require hard decisions and firm support by the BDG. Unless the university becomes more productive in training skilled manpower, Bangladesh will be unable to establish a quality domestic capability. On the other hand, the BAC will soon move to a newly constructed campus at Joydepur (provided by Japanese assistance), which will have excellent facilities and locate the complex very near the BARI and BRRI experimental stations. BAU, in its role as agricultural leader in higher education, should be supported as the central authority and head up a new organizational structure which incorporates the agricultural training programs of all institutions. A Board of Agricultural Education would seem appropriate to oversee the coordination of all agricultural training programs in Bangladesh.

The present appears to be an opportune time to initiate discussions with the BDG. Unless the existing institutions are made more effective, Bangladesh will not have the capability to meet its manpower needs for agricultural development. It would be unfortunate if a nation with such extensive needs for training had to rely completely on foreign facilities. Also, both BAU and BAC should be more clearly integrated into the science base serving agriculture. Closer working relationships with the MOA and other research institutions are needed.

(2) The Mission should provide training assistance to the Agricultural Extension Training Institutes (AETIs) as a complementary effort to support the research system and higher education. Extension is in dire need of upgrading, not only in terms of agent competence but also to restructure the service and to eliminate proliferation. The institutes are distinct units which already have programs which can readily accommodate technical assistance. The opportunity to assist extension, research, and higher education will benefit considerably from the facilities already in place. Most of them have new or remodelled

facilities, and the training input available through USAID would now be most appropriately timed.

Perhaps the greater need in human capital development in Bangladesh is in raising the literacy levels of the rural population. Within the strategy, primary/secondary training may have the highest priority. The emphasis on research and extension is a reflection of resource constraints of USAID and U.S. comparative advantage, more than an expression of relative priority between higher and elementary education. USAID's resource limitations and the recommended support of research and extension complements that suggested for higher education. But the needs of elementary education, particularly in the rural areas and among women, must be attended and the effort should not be delayed.

The huge funding requirements of primary and secondary educational support are more consistent with the resource availability of the multilateral donors, especially IDA and ADB. The recent entrance by IDA into primary educational programming is a beginning. USAID should encourage this initial effort to expand and should adopt a mix of training projects to place it in a position of strong advocacy for a people-oriented developmental strategy. If the Mission developmental assistance budget is expanded beyond the needs of research, extension, and higher education, support should be given to some aspect of primary education. Even now, the Mission should study the replicability of the secondary "school scholarship" program for women or a modification that would direct greater levels of family planning assistance to formal female education.

Amelioration of the role women play in Bangladesh agriculture could add a meaningful dimension to developmental programming and strategy. The issues surrounding women's contributions to the agricultural sector traverse all of the program priorities identified to this point, and recognition of the specific roles and tasks of women could help orient projects to insure that women's needs are strategically positioned. All USAID projects designed to meet developmental priorities should have an assessment of the relevance of women's role in the proposal. For the most part, women's initiatives should be component parts of broader development projects. Women-only projects generally should be avoided. The options for component initiatives are numerous. As examples, female participation should be highlighted in primary/secondary school programs. Women should continue to be given opportunities to participate in university, research, or extension improvement programs. The latter offers a high potential since women extension workers possess the added capability to interact with rural women in their homestead roles and the multitude of tasks associated with agricultural processes. Research programs can provide an informational base for homestead improvement within such elements as horticulture, small animals and poultry, food processing and storage, and

energy production. Likely, a significant portion of the rural home energy issue related to fuel could be resolved with special programs to encourage homestead cultivation of fast-growing tree varieties. The coalition of tree production programs with Title II foodgrain payments as incentives for care of trial introductions could further place Title II in the direct developmental mode. Similarly, family nutrition could benefit from new food preparation methods and food storage from recent advancements in technology. Information on wheat storage would be especially pertinent in a year such as 1983 when wheat acreage has been reduced due to limited availability of seed. The dominant role played by women in postharvest processing of foodgrains identifies postharvest losses as another prioity issues which could profit from trained women. Finally, a survey of the homestead organization and operation and the interaction of production and consumption functions would provide baseline data for a wide range of planning and analytical exercises.

Agricultural Production Inputs

Progress of the agricultural sector is, in large measure, determined by the availability of modern factors of production. The Mission's previous commitment to fertilizer development was well-founded, especially the emphasis given to policy reform which has led to development of the new marketing system and movement towards privatization of the distribution process. Continuation of a program to guarantee the institutionalization of a fertilizer production and distribution system is appropriate and should be supported to its successful conclusion. The Mission should maintain close surveillance of the program's progress in the event that the time element can be shortened from 1989 or that other donors might pick up the importation of non-urea fertilizers. Either change could free funds for other projects.

Irrigation and related water management also are the highest priority. The provision of commodities such as pumps and motors seems more appropriate for other donors. USAID should concentrate its support on technical assistance and research directed at on-farm water management and increasing the efficiency of private sector marketing of irrigation equipment.

Agricultural credit is also of high priority, provided the system is one which focuses on mobilization of savings and leads to proper pricing of credit. The proposed credit project by the Mission seems well-conceived in this respect. However, the size of the project ($25 million in 1984, with a ceiling of $75 million) represents about 33 percent of the Mission's development assistance program and weights the importance of agricultural credit somewhat higher than analyses in this assessment will support.

Two other inputs which are high priority and potentially compatible with research and associated technical assistance are animal power and seed production and distribution. Views on animal power already have been extensively presented. Evidence from the assessment suggests problems exist in the provision of improved seeds. The importance of this input is sufficient to attract the attention of the Mission as a priority. A particular feature to examine is the means by which the private sector can be brought into the seed business.

The importance of labor as an input in the total strategy strongly urges attention to development of labor skills and management ability. The total informational base on labor skills, wages, and migration is inadequate. Furthermore, the manpower development programs need attention both in providing basic skills as well as improving management ability. Those serving the public sector as project and program managers and others managing private sector corporations need training assistance. The resources of USAID may not be sufficient to include this area for some time to come. It is suggested that as a minimum the Mission enter into a dialogue with the BDG on manpower development as part of its effort to encourage more effective BDG policies.

The issues of land tenure policy are obviously relevant to the productivity and modernization of agriculture. The topics surrounding land tenure and land reform have been widely discussed, and summaries have been presented in this assessment. There is no convincing evidence, however, that the present tenure system will significantly deter or retard the agricultural strategy proposed herein (the assessment could go no further than to look at the existing literature). Therefore, modification of land tenure is not recommended as an area of priority USAID programming. The BDG has been in continuing dialogue regarding the potential impacts of land reform. Our independent reaction to the issues leads to the conclusion that redistribution of the land resources would not likely eliminate the underlying concerns given the consequences summarized earlier in this chapter. The problem would merely resurface at a later time so long as the basic causes continue unabated. Small farm sizes and counterproductive leasing arrangements are the essential antecedents around which a solution should be sought. The elemental concern is the extent to which either of these factors can be altered by BDG intervention and what would be the consequence of such intervention.

Product and Factor Market Efficiency

The increased use of the private sector and the marketplace is seen as a positive trend and should be encouraged. The scope of areas being brought under market influence is also appropriate since the effort is attempting to reduce BDG interventions and

subsidies in both product and factor markets. The public food distribution system, public ownership of food and fiber processing and marketing, input subsidies on fertilizer and irrigation equipment, and subsidies on credit are the main areas where progress toward more efficient markets has been made. More remains to be done, however. Therefore, USAID should encourage the BDG to clarify its philosophy with respect to its role in the product and factor markets serving agriculture and standardize its basis for intervention. Furthermore, the Mission should encourage the BDG to determine and clarify its policy with respect to government-provided market regulations and institutions. Of special concern should be the nature of the BDG program and capability to survey the markets in the interest of consumer and producer protection. The pressures and opportunities for market imperfections are extensive in Bangladesh. It would be unfortunate if the BDG's movement towards market participation was rendered ineffective by other forms of distortion. USAID should encourage the establishment of appropriate BDG interventions in providing market regulations, standards and measures, market information, and other institutional arrangements which foster market efficiency.

There are a wide range of infrastructural needs which will increase market efficiency. Most are extremely capital-intensive, however, and should not enter the priority list of USAID support in the foreseeable future. Most should be left to other donors and the private sector. The infrastructural support which should continue, however, is the construction associated with the Title II Food for Work program. The farm-to-market roads are especially important in creating better communications and improved market efficiencies, and their construction provides essential short term employment for a very needy segment of the population.

Storage facilities have already been recognized by AID as important to both foodgrain and fertilizer availability, especially in the absence of an adequate transport infrastructure. The marketing system requires storage beyond that already established for these crops, plus facilities for other crops. However, this is not a recommended priority for USAID support once the current assistance to fertilizer storage is ended. There is evidence that the private sector would provide investment capital for these ventures if regulations and controls are streamlined to reduce the transaction costs. USAID should encourage the BDG, as it determines and clarifies its role in agricultural markets, to make lines of credit available for storage development by the private sector. This can reduce the financial obligations of the BDG and facilitate market efficiency.

Public Policy Reform

Public policy dialogue should continue high on the agenda of issues to be pursued with the BDG. Failure to enact appropriate policies can compromise many elements of the strategy. In particular, BDG pricing policies for both products and inputs should be a constant concern.

Some issues of public policy have already been discussed, such as market interventions, subsidies, and the public food distribution system. Beyond these, the need to establish a rational system for domestic resource mobilization is paramount. Indeed, private savings must form the basis of a viable credit system, but the matter of public taxes must be confronted not only as a revenue source but also for their value in redistributing income. These are difficult issues in a nation with such low per capita incomes. Taxation is an area of USAID concern; but not one for special priority participation. The World Bank and IMF can provide greater help, but they should have the support of USAID in encouraging BDG action.

A policy-related issue which is critical to the strategy is the importance given to food security and the interrelationship it has with those of developmental priorities. In so many cases, the failure to distinguish between welfare and development problems and goals has blunted the effectiveness of development efforts and distorted the overall development strategy of Bangladesh. Resources have been diverted to meet the demands of subsidies which have not always contributed in a meaningful way to the development effort. In fact, it appears that the goal of establishing food security has not been served effectively by such subsidies. The present food security system seems to struggle annually to fill the production shortfalls in response to uncertain levels of donor food aid.

An important part of the policy matrix should be to establish a system of insuring food security for Bangladesh that is independent of the development program. It is not entirely clear what form the system should take given the uncertainties of future donor support and the hetrogeneity of individual donor motives and regulations associated with extending food aid to Bangladesh. In truth, the underlying motives and domestic politics of individual nations may be so consequential in determining the form and amounts of assistance provided as to render any type of structured security program impractical. Many donors may find the conditions of a structured system and commitment entirely incompatible with their domestic realities. Even so, the need to remove the inefficiencies imposed by the food security orientation of the BDG persist.

The suggestion that Bangladesh be a participant in a worldwide storage system is not the kind of security envisioned. Rather, the system might take the form of binding long-term guarantees by the donor community, with special participation

from perhaps the Arab Development Fund, to insure that Bangladesh can count on minimal foodgrain needs in future years. The present system produces continued uncertainty. The BDG is continually preoccupied with food security and cannot give undiluted attention to the longer run strategy of development. Sustained increases in food production, however, become the ultimate in food security. This must come to pass, as Bangladesh's needs cannot be met ad infinitum from the outside.

The possibility that Bangladesh is currently at or approaching foodgrain self-sufficiency has important implications for future USAID programming, particularly for Title III. The reality of the foodgrain situation is in need of early clarification. But beyond this initial step, the Mission should begin consideration of alternative scenarios for continuing the policy-oriented type initiatives which have been carried out successfully to date. The questions and issues associated with a change in the Title III commodity mix that would be required if and when Bangladesh reaches foodgrain self-sufficiency require early deliberation. Title III programming has already established the practice of commodity flexibility, and the success in self-targeting wheat within the present rationing system portends an improved likelihood that future alterations in the commodity mix might likewise be accomplished successfully. For example, corn, vegetable oils, and cotton represent potential replacements for wheat in the PL-480 program for Bangladesh.

The adequacy of the public policy base is being influenced by the inadequate data base and limited capability for policy analysis. The data system is not producing enough data of consistent quality and relevance to the agricultural sector, particularly with respect to acreage, yields, and farm level prices. Additionally, the data is not being processed in a timely way; and publication delays, even for routine data, are inordinate. Technical assistance could be useful, perhaps in consort with the determination of marketing policy suggested previously. Improvement in the capacity to effectively utilize and manage the data and to design public policy also merits a high priority.

Export Development and Employment

The problem of insufficient exports is a crucial variable in the overall strategy. Not only are exports important to the balance of trade issues, but, also, they can represent a considerable force in improving employment opportunities for the populace, both in and out of agriculture.

It is much easier to recognize the need for export development than to offer specific prescriptions for accomplishing the deed. The scope of options are literally as wide as the comparative advantage of Bangladesh. At this point, formulation of an appropriate industrial policy and improvement

in the atmosphere for investment seems to be of highest priority. Individual options and investment opportunities cannot be identified from the Assessment and, in fact, should not be since the private sector will do much of this "sorting out" once the investment climate is cleared. The BDG has said it wants a greater private sector role and the development of a strong export sector. It must, however, demonstrate that it is willing to provide much more than rhetoric.

To be successful the BDG must remove restrictive governmental controls and cumbersome regulations which result in very high transactional costs for private investors and reduce or eliminate Bangladesh's inherent comparative advantage. Also needed is a capability and system for continuing analysis of options for trade promotion, both domestically and abroad, and for dialogue with investors. Two basic steps are apparent. First, restrictive controls and regulations must be eliminated if private investment is to be encouraged. Secondly, the export potentials need to be identified, a strategy prepared, and a promotional support system created. As a related issue, USAID should encourage the continued disinvestment of most public corporations. The current management has left them unable to compete profitably in export markets. At the same time the Mission should encourage the BDG to relax its control and regulation of the import/export sector.

The small industries potential for Bangladesh should be developed both as a source of nonfarm employment and for its export value. Those industries with forward linkages into agriculture and those which utilize agriculture as a source of primary raw materials should be looked at with special interest. For example, the advancement of artisan production utilizing jute as a base material has obvious appeal. Development of small industries is a part of the overall strategy, but the identification of particular projects and activities must be deferred to more extensive study. However, entrepreneurial development should be a general focus of USAID assistance in consort with the policy changes to insure optimal private sector participation.

Summary Breakdown of Alternatives

The preceding statement of recommended USAID programming options constitutes a list of topics considered essential to the implementation of the proposed developmental strategy. In this section, the options are summarized and assigned priorities. The process reflects the relative advantages of USAID within the developmental needs of Bangladesh. It does not necessarily order or reflect the overall developmental priorities of the nation.

I. <u>High Priority</u>:

(a) Agricultural Research

(1) Water management
(2) Farm power
(3) Expanded focus to include: fisheries, forestry, poultry, livestock, horticulture, jute, and other nonfoodgrain crops

(b) Human Capital

(1) University level education at BAU, BAC and BARI
(2) Agricultural extension--focus on AETIs.
(3) Primary/secondary education--as funding is available and as part of population control program

(c) Continued Public Policy Dialogue

(1) Domestic resource mobilization
(2) Food security system
(3) Factor inputs
(4) Manpower
(5) Natural resources
(6) Import/exports
(7) General developmental strategy
(8) Developing ag/nonag linkages
(9) Financial markets

(d) Development of Agricultural Services

(1) Fertilizer
(2) Irrigation equipment and services
(3) Credit

(e) Factor and Product Market Efficiency

(1) Continue trend toward privatization
(2) Guarantee integrity of market operations
(3) Enhance efficiency of legitimate BDG market interventions

(f) Data Generation and Policy Analysis

(1) Develop improved and updated data series
(2) Develop improved capacity for policy analysis

(g) Women in Development

(1) Strengthen WID components of development projects

II. Medium Priority

(a) Seed production and distribution
(b) Manpower development of off-farm employment strategy
(c) Farm storage
(d) Traditional forms of agricultural energy
(e) Agricultural chemicals
(f) Small industries and those with forward linkages into agriculture.

III. Low Priority

(a) Land tenure
(b) Physical infrastructure (except food-for-work, rural roads, and embankments).

Footnotes

[1]For a more detailed discussion of the role of agriculture in economic development, and the definition of the specialized meaning of a "surplus" see: William H. Nichols, "The Place of Agriculture in Economic Development," in Agriculture in Economic Development, ed. by Carl K. Eicher and Lawrence W. Witt (New York: McGraw Hill, 1964), pp. 11-44; and E. Boyd Wennergren and Morris D. Whitaker, The Status of Bolivian Agriculture (New York: Praeger Publishers, 1975), pp. 1-16.

[2]Since rural consumers are also producers, the falling farm price also tends to reduce their revenues. Thus, increases in real income from decreased food costs tend to be offset by decreases in revenue. But, early innovators will continue to realize higher income as production costs fall faster than prices.

[3]A detailed discussion of this conceptualization of the agricultural development problem is presented in Yijiro Hayami and Vernon W. Ruttan, Agricultural Development: An International Perspective (Baltimore and London: The John Hopkins Press, 1971), and in Vernon W. Ruttan, Agricultural Research Policy, (Minneapolis: University of Minnesota Press, 1982), Chapter 1 and 2.

[4]Hayami and Ruttan, Agricultural Development, pp. 43-63. The term "biological technology" used in this assessment is borrowed from the same source.

[5]This is the essential basis for the employment-oriented strategy proposed by Mellor, see: John W. Mellor, The New Economics of Growth, (Ithaca: Cornell University Press, 1976).

[6]Hayami and Ruttan, Agricultural Development, p. 45.

[7]See Hayami & Ruttan, Ibid, and Vernon W. Ruttan, Agricultural Research Policy for a detailed discussion of their conceptualization of the process of agricultural development, and the derivation of these policy variables. See also Theodore W. Schultz, Transforming Traditional Agriculture (New Haven, Connecticut: Yale University Press, 1964), for an earlier exposition on the theory of agricultural development which identifies these policy variables.

[8]Hayami and Ruttan, Agricultural Development, p. 305.

[9]See Ruttan, Agricultural Research Policy, Chapter 10.

[10]See Theodore W. Schultz, Investing in People: The Economics of Population Quality (Berkeley: University of California Press, 1981), for an excellent formulation which argues convincingly for the preeminent role of human capital in fomenting agricultural development.

[11]See Ruttan, Agricultural Research Policy, Chapter 4; and U.S. Agency for International Development, A.I.D. Policy Paper: Food and Agricultural Development, Washington, D.C., May 1982, pp. 4, 7.

[12]Population control programs obviously must continue to receive attention. But clearly, given the dynamics of demography, there is no escaping the immediate urgency to increase agricultural productivity and foodgrain production.

[13]Assumes replacement level fertility (RLF)--about 2 children per woman--is reached by the year 2000. The current RLF is 6.2 children per woman. The prevalency rate of contraceptive use would have to reach over 60 percent by 2000 to achieve this outcome (see Figure 1, Chapter 2).

[14]Raymond P. Christensen, Taiwan's Agricultural Development, U.S. Department of Agriculture, Foreign Agricultural Economic Report No. 39, Washington D.C., April 1968, p. 2.

[15]Ruttan, Agricultural Research Policy, p. 40.

[16]The quantity of fertilizer sold during the first eight months of 1983 is slightly higher than last year, despite a price increase of 18 percent in July 1982.

[17]The added evidence from Taiwan's experience further supports this position. "Credit was readily available but interest rates have been relatively higher as compared with those in developed countries." See: Christensen, Taiwan Development, p. 87.

[18]For a review of the current thought on land tenure issues see: Muhiuddin Khan Alamgir (Editor), Land Reform in Bangladesh, (Dhaka: Center for Social Studies, September 1981); and F. Tomasson Jannuzi and James T. Peach. Bangladesh: a Profile of the Countryside, USAID/Bangladesh, Dhaka, April 1979.

[19]Mellor, New Economics of Growth.

[20]See Chapter 7 for an additional discussion of AID's Program.

[21]A formal consortium arrangement is not necessarily implied. Other types of multi-institutional arrangements involving specific universities or private sector firms can be formulated to meet the special needs of Bangladesh.

[22]AID, Agriculture Policy Paper, p. 8.

Selected Bibliography

Abdulla, Abu. "Land Reform and Agrarian Change in Bangladesh." The Bangladesh Development Studies II, Number 1 (January, 1976).

Abedin, Najmul. Local Administration and Politics in Modernizing Societies-Bangladesh and Pakistan. Dhaka: Oxford University Press, 1973.

Adams, Dale W. and Graham, Douglas H. "A Critique of Traditional Agricultural Credit Projects and Policies." Occasional Paper No. 621, Department of Agricultural Economics and Rural Sociology, The Ohio State University, June 20, 1980.

Adams,Gary D. "Experimental Approaches to Rural Finance in Bangladesh." Paper prepared for Rural Finance Workshop, Kathmandu, Nepal, April 7-9, 1980.

Ahmed, Abdul Mansur. End of a Betrayal and Restoration of Lahore Resolution. Dhaka: Khoshroz Kitab Mahal, 1975.

Ahmed, Akhter Uddin, "Diesel and Electric Power Pump Irrigation. A Comparative Analysis." USAID, May, 1981. (Mimeographed.)

Ahmed, Ali. Basic Principles and Practices of Administrative Organization: Bangladesh. Dhaka: National Institute of Local Government, June, 1981.

_____. Role of Higher Civil Servants in Pakistan. National Institute of Public Administration. Dhaka, June, 1968.

Ahmed, M. M. "Need for Government Policy on Cooperatives." Co-operation, A Quarterly Journal. (July-December, 1979).

Ahmed, Raisuddin. Agricultural Pricing Policies Under Complex Socio-Economic and Natural Constraints. Washington, D.C.: International Food Policy Research Institute, October, 1981.

_____. "Foodgrain Distribution Policies Within a Rural Pricing Mechanism: The Case of Bangladesh." reprinted in Development Issues in an Agrarian Economy - Bangladesh. Dhaka: Center for Administrative Studies, 1981.

Alamgir, Muhiuddin. Development Strategy for Bangladesh. Dhaka: Center for Social Studies, Dhaka University, June, 1980.

_____, and Berlanger, Lodewijk J. J. B. "Evaluation of Income Elasticity of Demand for Foodgrain in Bangladesh from Cross-Sectional Data: A Skeptical View." The Bangladesh Economic Review, (October, 1973).

Alamgir, Susan Fuller. Profile of Bangladeshi Women. Dhaka: USAID, 1977.

Allen, Richmond. "Agricultural Pricing," Internal Memo, USAID, August 24, 1981.

_____. "Rural Industries Employment." Internal Memo, USAID, November, 1979.

_____. "Rural vs. Urban Population Growth Rates." Internal Memo, USAID, January 22, 1982.

Asian Development Bank. "Statement of Loans." May 14, 1982. (Mimeographed.)

_____. Annual Report - 1981. March, 1982.

Arndt, Thomas M., Dalrymple, Dana G., and Ruttan, Vernon W. Resource Allocation and Productivity in National and International Agricultural Research. Minneapolis: University of Minnesota Press, 1977.

Ather, S. A. Evaluation Report on USAID Scholarship Program for Girls in Sharashati Thana, Comilla. Dhaka: USAID, March, 1983.

Bangladesh, Agricultural Development Corporation. Monthly Newsletter. July 15, 1981.

_____. Statistics on Distribution of Improved Seeds 1962-1981. Dhaka, undated.

Bangladesh, Agricultural Research Council. Annual Report, 1979-80. Undated.

_____. This is BARC. December, 1980.

_____, and International Fertilizer Development Center. Agricultural Production, Use and Equity Considerations - Results and Analysis of Farm Survey Data, 1979-80. December, 1981.

Bangladesh, Bureau of Statistics. Bangladesh Population Census Report, 1974. October 24, 1977.

_____. Land Occupancy Survey of Rural Bangladesh. December, 1978.

_____. Monthly Statistical Bulletin. May, 1975, December, 1981 and March, 1982.

_____. Population Projections of Bangladesh (1975-2025). Undated.

_____. Report on Agricultural Census of Bangladesh - 1977. June, 1981.

_____. Report on the Household Expenditure Survey of Bangladesh, 1973-74. Vol. I, August, 1978.

_____. Socio-Economic Indicators of Bangladesh. December, 1980, September, 1981, November, 1981, January, 1982.

_____. Statistical Yearbook of Bangladesh - 1980.

Bangladesh, Department of Agricultural Extension and Management. Annual Report 1979-80 and 1980-81. Undated.

Bangladesh, Inland Water Transport Authority. Annual Ports and Traffic Report, 1977-78. Undated.

Bangladesh, Jute Research Institute. Annual Report for 1981. March, 1982.

Bangladesh, Ministry of Agriculture. Bangladesh Agriculture in Statistics. 1973.

_____. Cooperative Movement in Bangladesh During 1980-81 - An Interim Report. November, 1981.

_____. Costs and Returns Survey for Bangladesh. Volumes I, III, and V. 1979-80.

Bangladesh, Ministry of Education. "Bangladesh Education System." Publication No. 6, 1982. (Mimeographed.)

Bangladesh, Ministry of Finance. Flow of External Resources Into Bangladesh. November 6, 1981.

Bangladesh, Ministry of Food. Annual Report 1978-79. July, 1979.

Bangladesh, Ministry of Health and Population Control. "Bangladesh Contraceptive Prevalence Survey 1981 (Tables)." Management Information System Unit, December, 1981.

Bangladesh, Ministry of Jute. An Annual Review. 1977-1980.

Bangladesh, Planning Commission. The Second Five Year Plan, 1980-85. May, 1980.

Bangladesh, Rice Research Institute. Annual Report 1978-79. September, 1981.

Bangladesh, Sugar Research and Training Institute. Annual Report 1981. No. 25, December, 1981.

Bangladesh Tea Research Institute. Annual Report 1978. Undated.

Bangladesh, University Grants Commission. Reforms from the University. October, 1981.

Berger, Louis, Int. Rural Roads Study, Final Report. Vol. X, February, 1979.

Blair, Harry W. "Rural Development, Class Structure and Bureaucracy in Bangladesh." World Development, Vol. VI, No. 1, 1978.

Brundin, Hjalmar. Food for Work Saturation Level and Constraints to Expansion Study. Dhaka: USAID, October, 1978.

Chaudhury, Rafiqul and Curlin, George C. "Dynamics of Migration in a Rural Area of Bangladesh." The Bangladesh Development Studies, (April, 1975).

_____, and Ahmed Nilufer Raihan. Female Status in Bangaldesh. Dhaka: Bangladesh Institute of Development Studies, undated.

Chaudhury, R. F., "Education and Fertility in Bangladesh." The Bangladesh Development Studies, V., No. 1 (January, 1977).

_____. "Married Women in Non-Agricultural Occupations in a Metropolitan Area in Bangladesh - Some Issues and Problems." The Bangladesh Development Studies, V, No. 2 (April, 1977).

Christensen, Raymond P. Taiwan's Agricultural Development. Washington, D.C.: U.S. Department of Agriculture, Foreign Agricultural Economic Report No. 39, April, 1968.

Clay, E. J. "Food Aid and Food Policy in Bangladesh." The Bangladesh Journal of Agricultural Economics. I, No. 2 (December, 1978.

Clayton, W. E. Review of Fertilizer Distribution and Handling System in Bangladesh. International Fertilizer Development Center, July 31, 1981.

Dawson, Murry D. "Effective Transfer of Improved Technology." Technical Papers in Agricultural Research. International Agricultural Development Service, I, 1978-81.

Eicher, Carl K. and Witt, Lawrence W., ed. Agriculture in Economic Development. New York: McGraw Hill, 1964.

Denmark, Government of. "Status Report on Bilateral Cooperation Between Bangladesh and Denmark." November, 1981. (Mimeographed.)

East Pakistan, Government of. Transport Survey of East Pakistan. Vol. I, 1961.

Faaland, Just and Parkinson, J. R. Bangladesh - The Test Case for Development. Boulder: Westview Press, 1976.

FAO/UNDP Mission to Bangladesh. "Agriculture Employment in Bangladesh." Working Paper XI, Dhaka, April, 1977.

Farruk, Muhammad O. "The Structure and Performance of the Rice Marketing System in East Pakistan." Occasional Paper No. 31. Cornell University, June, 1970.

Franda, Marcus. Bangladesh: The First Decade. New Delhi: South Asia Publishers Pvt. Ltd., 1982.

Galbraith, John K. The Underdeveloped Country. Canadian Broadcasting Corporation, 1965.

Gerard, Rene, et al., Report of the Feasibility Survey of Productive Income Generating Activities for Women in Bangladesh. Dhaka: UNICEF, October, 1977.

Germany, Federal Republic of. "Status of Bangladesh - German Cooperation in the Field of Agriculture." Undated. (Mimeographed.)

Gill, J. Operational Funding Constraints on Agricultural Research in Bangladesh. Bangladesh Agricultural Research Council. Report No. 9, undated.

_____. Farm Power in Bangladesh. Vol. I, Development Study No. 19, Department of Agricultural Economics and Management, University of Reading, September 19, 1981.

_____. Pilot Survey of Farmers' Sources of Information. Dhaka: Agricultural Development Council, November, 1982.

Greely, Martin. "Rural Technology, Rural Institutions and The Rural Poorest: The Case of Rice Processing in Bangladesh." The Bangladesh Development Studies, III, Nos. 1 & 2, (Winter/Summer, 1980).

Hamid, M. A. "Food Demand - Supply Projections: Bangladesh 1978-2000." Bangladesh Development Studies. III, Nos. 1 and 2 (Winter/Summer, 1980).

Hayami, Yujiro, and Ruttan, Vernon W. Agricultural Development: An International Perspective. Baltimore and London: Johns Hopkins Press, 1971.

Hayley, David H. "The Effects of Corruption in Developing Nations." Western Political Quarterly, XIX (December, 1966).

Haque, A. K. M. Zahirul. "The Cooperative and the State." Cooperation, A Quarterly Journal, (July-December, 1979).

Haque, Rabiul, "Ferry Services Between Road Gaps in Bangladesh." USAID, January, 1981.

Hong, Sawon. Demographic Characteristics of Bangladesh. Dhaka: June, 1980.

Hossain, Mahabub. "Food Production in Bangladesh: Performance, Potential and Constraints." III, Nos. 1 and 2, Bangladesh Development Studies, Winter/Summer, 1980.

Husain, A. M. Muazzam and Momen, Md. Abdul. The Jute Marketing System in Bangladesh. Bangladesh Agricultural University, Mymensingh, August, 1974.

Huq, Mahfuzul. Food Policy and National Planning in Bangladesh. Bangladesh Development Studies, III, Nos. 1 and 2, Winter/Summer, 1980.

Huq, Ziaul and Antholt, Charles H. "Analysis of Foodgrain Production Trends in Bangladesh." Dhaka, USAID, January, 1982. (Mimeographed.)

Institute of Nutrition and Food Science, Economic and Nutritional Effects of Food for Relief Work Projects. University of Dhaka, March, 1978.

International Agricultural Development Service. Agriculture Development Indicators, 1981.

Islam, Nurul. Development Planning in Bangladesh. A Study In Political Economy. Dhaka: University Press Limited, 1977.

Islam, Rizwanul. "Food Grain Procurement, Input Subsidy and the Food Distribution System in Bangladesh: An Analysis of the Policy Package." Bangladesh Development Studies, II, Nos. 1 and 2, Winter/Summer, 1980.

_____. "Trends in Income Distribution in Bangladesh." Development Issues in an Agrarian Economy - Bangladesh. Dhaka: Center for Administrative Studies, 1981.

Islam, Rushidan. "Approaches to the Problem of Rural Unemployment in Bangladesh." Paper presented to the Third Annual Conference of the Bangladesh Economic Association, Rajshahi, 1977.

Islam, Shamina, "Women's Education in Bangladesh." The Situation of Women in Bangladesh. Dhaka: UNICEF, 1979.

Jabbar, M. A. "Draft Power Shortages and Mechanization of Tillage in Bangladesh. The Bangladesh Journal of Agricultural Economics, Vol. III, No. 1, June, 1980.

_____. "Fertilizing Behavior of a Sample of Bangladesh Farmers." The Bangladesh Journal of Agricultural Economics, II, No. 2 (December, 1979).

_____. and Mandal, M. A. S., "A Survey of Weights and Land Measurement Units Used in Bangladesh." The Bangladesh Journal of Agricultural Economics, III, No. 1 (June, 1980).

Jahan, Rounaq, "Political Participation of Women in the 1973 Election in Bangladesh." Paper presented at the Annual Meeting of the Association of Asian Studies, Boston, 1974.

Jannuzi, Tomasson and Peach, James. Bangladesh: A Profile of the Countryside. USAID. April, 1977.

Japan, Government of. "Japanese Government Assistance to Bangaldesh, 1971-81." Undated. (Mimeographed.)

Kabir, Khushi; Abed, Ayshed and Chen, Marty. "Rural Women in Bangladesh." Proceedings of Role of Wo .en in Socio-Economic Development in Bangladesh, Bangladesh Economic Association, Dhaka, March, 1977.

Keller, Jack, et al. "Irrigation Development Options and Investment Strategies for the 1980's." USAID/Bangladesh Report, Water Management Synthesis Project, Utah State University, September, 1980. (Mimeographed.)

Khan, A. Jalil. "Whither IRDP - Cooperatives?" Cooperation, A Quarterly Journal, (July-December, 1979).

Khan, A. R. Employment in Bangladesh During the Second Five Year Plan. International Labor Office, October, 1979.

Khan, Akhter Hamid. "Review of the Functions of the IRDP National Office and the TCCA's." Cooperative, A Quarterly Journal (July-December, 1979).

Khan, Salam, et al., (ed.). Inventory for Women's Organizations in Bangladesh. Dhaka: UNICEF, June, 1981.

Khuda, Barkat-E. "Measurement of Underemployment in Rural Bangaldesh - An Alternative Method." Development Issues in an Agrarian Economy - Bangladesh. Dhaka: Center for Administrative Studies, University of Dhaka, 1981.

_____. Fertility Level and Attitudes and the Value of Children in Sreebollobpur: A Relatively Developed Bangladesh Village, Bangladesh Institute of Development Studies, Dhaka, New Series No. 29, October, 1980.

Knight, Henry. Food Administration in India, 1937-47. Stanford, California: Stanford University Press, 1954.

Mahmud, Wahiduddin. "Development Strategy and the Problem of Food Supply in Bangladesh." Bangladesh Development Studies, III, Nos. 1 and 2, (Winter/Summer, 1980).

Maloney, Clarence; Aziz, K. M. Ashraful, and Sarker, Profulla C., Briefs and Fertility and Bangladesh. Dhaka: Institute of Bangladesh Studies, 1980.

Martin, M. A. "Water Potential of Bangladesh." Paper presented at Workshop on Water Management, Joydebpur, January 5, 1981.

Marum, M. Elizabeth, Women at Work in Bangladesh. Dhaka: USAID, 1982.

Mellor, John W. The Economics of Agricultural Development. Ithaca, N.Y.: Cornell University Press, 1967.

_____. The New Economics of Growth. Ithaca, N.Y.: Cornell University Press, 1976.

Moseman, A. H., et al. Bangladesh Agricultural Research System. Ministry of Agriculture, July 18, 1982.

Newland, Kathleen. Women and Population Growth, Choice Beyond Childbearing. Washington, D.C.: Worldwatch, Paper 16, December, 1977.

Nyrop, Richard F., et al. Area Handbook for Bangaldesh. Washington, D.C.: The American University, 1975.

Owen, Wyn F. "The Double Development Squeeze on Agriculture." American Economic Review, 56 (March, 1966).

Pasour, E. C. Jr. "Cost of Production, A Defensible Basis for Agricultural Price Supports?" American Journal of Agricultural Economics, 62, No. 2 (May, 1980).

Rabbani, A. K. M. Ghulman, et al. Summary Report of the 1978 Land Occupancy Survey of Rural Bangladesh. Bureau of Statistics, December, 1978.

Rahman, Khandakar. The Experience of Marketing with Regards to Small Farmers in Bangladesh with Particular Reference to Comilla Rural Development. Comilla, August, 1975.

Richardson, Blaine C., et al. "Food Aid Title I and Title III, Project Impact Evaluation." USAID/Dhaka, January-February, 1983.

Ruttan, Vernon W. Agricultural Research Policy. Minneapolis: University of Minnesota Press, 1982.

_____. "Induced Technical and Institutional Change and the Future of Agriculture." The Future of Agriculture: Theme Papers. Presented at the Fifteenth International Conference of Agricultural Economists, Sao Paulo, Brazil, August, 1973.

Schultz, Theodore W., ed. Distortions in Agriculture Incentives. Bloomington: Indiana University Press, 1978.

_____. Investing in People: The Economics of Population Quality. Berkley: University of California Press, 1981.

_____. Economic Dynamics of Agricultural Development. Public Lecture, November 7, 1980, Jakarta, Indonesia. (Mimeographed.)

Seckler, David. "The Economics of Nutrition in Subsistance Agriculture: The Case of Bangladesh." New Delhi: Ford Foundation, February, 1979.

Smock, Audrey C., ed. Women's Roles and Status in Eight Countries. New York: Wiley and Sons, 1977.

Sobhan, Rehman, and Ahmad, Muzaffar. Public Enterprise in an Intermediate Region: A Study in Political Economy of Bangladesh. Dhaka: Bangladesh Institute of Development Studies, 1980.

_____. The Crises of External Dependence, Dhaka: Dhaka University Press, 1982.

Stepanek, Joseph F. Bangladesh: Equitable Growth? New York: Pergamon Press, 1979.

Sweden, Government of. "Development Cooperation Between Sweden and Bangladesh." February, 1982. (Mimeographed.)

Swedish International Development Authority. Development of the Institute of Nuclear Agriculture. Report of a review mission, Vienna, 1980.

Swenson, Geoffery, et al. "Wheat Cultivation in Bangladesh." Bangladesh Agricultural Research Institute, No. 81-1, June, 1980.

United Kingdom, Government of. "Summary of Existing Projects." Undated. (Mimeograph.)

United Nations. World Statistics in Brief, 5th Ed. New York: FAO, 1981.

United States, USAID. A.I.D. Policy Paper: Food and Agricultural Development. Washington, D.C.: May, 1982.

_____. Audit Report on the Bangladesh Food for Work Program. November 29, 1981.

_____. "Bangladesh Fertilizer Distribution Improvement." Project Paper, June, 1978.

_____. "Bangladesh: Rural Sector Energy-Project." Project Paper, December, 1981.

_____. "Family Planning Services," Project Paper, October, 1980.

_____. "Agricultural Research Phase II." Project Paper, December, 1980.

_____. "Bilateral Economic Assistance to Bangladesh - All Years Summary." April, 1982. (Mimeograhed.)

University of Dhaka. Nutrition Survey of Rural Bangladesh, 1975-76. December, 1977.

Wennergren, E. Boyd and Whitaker, Morris D. Status of Bolivian Agriculture. New York: Praeger Publishers, 1975.

taker, Morris D. and Wennergren, E. Boyd. "Access Roads and Spontaneous Colonization: The Bolivian Experience." Land Economics, (February, 1976).

·ld Bank. Annual Report, 1980. June 30, 1980.

_____. Agricultural Credit in Bangladesh. Report No. 3309-BD, September 29, 1981.

_____. Bangladesh Current Economic Position and Short Term Outlook. Report No. 2870-BD, March, 1980.

_____. Bangladesh Current Economic Situation and Review of the Second Plan. Report No. 3309-BD, February 23, 1981.

_____. Bangladesh: Current Economic Situation and Review of the Second Plan. Report No. 3309-BD, September 28, 1981.

_____. Bangladesh: Food Policy Issues. Report No. 2761-BD, December 19, 1979.

_____. Bangladesh: Recent Economic Developments and Selected Developmental Issues. Report No. 3768-BD, March 3, 1982.

_____. Bangladesh Recent Economic Trends and Medium Term Development Issues. Report No. 4277-BD, March 4, 1983.

_____. "IDA Lending to Bangladesh During FY 79 and FY 80." Undated. (Mimeographed.)

_____. "IDA Lending to Bangladesh Since Independence. December, 1971 through June, 1981." June 25, 1981. (Mimeographed.)

_____. Integrated Rural Development Program. A Joint Review By Government and the World Bank. January, 1981.

_____. Staff Appraisal Report Textile Industry Rehabilitation Report. Report No. 3568-BD, July 27, 1981.