

**CHANGES IN LAND USE / LAND COVER WITHIN  
THE INDO GANGETIC PLAIN REGION :  
BANGLADESH**

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## **ABSTRACT**

Bangladesh with a total area of 1,47,570 sq. km and a population of more than 120 million is the most densely populated country in the world. The population of the country has increased rapidly during the last couple of decades. The broad landuse categories are agricultural, forestry and non-agricultural. To meet the demand of an increasing population, there has been encroachment upon forests and marginal lands. The wetlands have also been reduced due to conversion to farmlands. Recent prawn cultivation has also reduced forest and agricultural lands.

Bangladesh has a sub-tropical monsoon climate. 80% of the rainfall occurs during summer monsoon months namely June to September. The winter and premonsoon seasons are quite dry. The winter months during November to February are pleasant with minimum temperatures between 7-12 degree C and maximum temperature of 24-31 degree C. The maximum temperature recorded in summer months is 37 degree C. The country has excess of rainfall during summer months whereas there is deficit of rainfall during the rest of the year. The average annual rainfall varies from 1429 to 4338 mm. The country is devastated very often by severe flooding during the monsoon whereas droughts during premonsoon period are not uncommon. The country is frequently visited by severe tropical cyclones with immense loss of lives and property.

Most of Bangladesh is a flood plain country with very low elevation. In the coastal area the elevation is only few metres and as a result vulnerable to storm surges. The Bangladesh coast has the largest mangrove forest in the world in Southwestern side. Recently the Mangrove forest is being degraded due to top dying of its main species, the Sundari trees. There is some hilly areas in the south eastern part bordering Myanmar and north eastern part bordering Assam of India. Due to increased cropping intensities, waterlogging, indiscriminate use of fertilizers and other chemicals and poor irrigation management, there has been extensive depletion of organic matter in the soil.

The economy of the country is mainly agrarian, though the proportional contribution to the GNP from agriculture has declined recently, which is about one third at the moment. The GNP per capita is about \$250.

The driving forces for landuse and landcover changes are the increase in population, urbanization, global change etc. Land use policies should be adopted to manage the land for optimum, economic and sustainable development.

## **1. Introduction**

Most of the total area of Bangladesh is low land. The country is mainly formed by sediments washed down from the highlands especially from the Himalayas. The greater part of this land-building process is due to the main river system the Ganges, the Brahmaputra, the Meghna and their numerous tributaries and distributories numbering about 230. There is some hilly regions in the north east and south east. The elevation gradually rises towards northwest. Madhupur and Barind tracts situated in the north and north western part of the country represent old alluvial terraces. The largest single block mangrove forest of the world - the Sunderbans is situated in the southwestern part of the Bangladesh coast. Besides there are some depression areas in different parts of the country. The country has an area of 147570 sq km.

### **2.1 The Ancient Land Use**

Being an alluvium country, Bangladesh always had a rich agriculture. The beginnings of Agriculture go back to pre Aryan times<sup>(1)</sup>. More and more land was brought under cultivation and advantage taken of the fertilization of the soil by the regular inundation of the low land by annual flooding.

In the 7<sup>th</sup> century Chinese traveller Huan Tsang travelled over the country and remarked that there was intensive cultivation of land and the abundant production of grains, fruits and flowers. Agriculture was the backbone of the economy. Rice acquired the greatest importance as it was most suited to the soil and climate and all the three methods of cultivation, broadcast, by drill and transplantation were used. The inscriptions of the Sena Kings (12<sup>th</sup> Century) contains descriptions of rich and extensive paddy fields and prosperous villages. Reaping and thrashing methods appear to have been similar to those practised at present. Sugarcane was also cultivated in several parts. The book Periplus of the Erythrean sea during Roman times mention the cultivation of mustard, malabathrum and spikenard. Betelnut, cocoanut and many kinds of fruits like bananas, dates, mangoes, oranges, lemon, figs and pomegranates were also cultivated. The most important cash crop was cotton for the manufacture of cotton fabrics which had a continuous history from the beginning of the Christian era to the early 19<sup>th</sup> century. Through the 13<sup>th</sup>, 14<sup>th</sup>, 15<sup>th</sup> centuries the area continued to prosper agriculturally despite foreign invasions. Agricultural prosperity and the great abundance of food and raw materials caused the entire Bangladesh area to be considered a natural storehouse. All travellers to Bangladesh spoke highly of its plentiful resources. Ibn Batuta, Marco Polo, the Italian Lewis Vertomannus, Ceaser Frederick, Ralph Fitch and many other historians, during thirteenth to fifteen centuries corroborated the Bangladesh's matchless fertility abundance and prosperity. Yields were high, crops

were many and prices unbelievably low. Ibn Batuta mentioned that an ordinary family could buy its yearly provisions of food stuffs for about seven rupees.

However, occasional natural disasters like floods, heat and humidity caused suffering to westerner who termed Bangladesh a “hell full of blessings and good things of life”<sup>(2)</sup>.

During the Mughal rule, the area achieved much prosperity based on increased and varied agricultural production, developing industry and expanding commerce and trade. Abul Fazal’s Ain-I-Akbari<sup>(3)</sup> throws considerable light on the economy of Bangladesh during this time. In agricultural production, cultivation of numerous varieties was dominant. In many areas, three crops a year was raised and long-stemmed rice flourished in deeply flooded areas. Rice was a surplus product. Other crops plentifully cultivated were pulses, sugarcane, sesamum, cotton, wheat, millet and safflower.

According to Ain-I-Akbari, land was classified into four main divisions :

- (1) Annually cultivated for each crop in succession and was never left fallow.
- (2) Left out of cultivation for sometime to recuperate its strength and fertility.
- (3) Left fallow for three or four years.
- (4) Left fallow for more than five years or more.

Of the first two kinds of land there were three classes, good, moderate and bad. The system of land assessment instituted by Shershah and amended by Akbar into payment of dues in cash instead of kind. Each season a staff compiled a crop statement working over the cultivated area of the village. The amount of annual revenue paid to the Mughal king during the late sixteenth century was Rs. 6,337,052 paid in cash. When the East India company acquired the diwani of Bengal, the net amount of all revenue was Rs. 25,624,223.

The landuse pattern of Bangladesh has changed a lot with time. Cotton and silk which was abundant before the coming of the British declined. Instead Indigo and safflower, for producing dyes which had great demand in Europe and stimulated by foreign commercial enterprise flourished. Their cultivation spread at the expense of rice and cotton. Indigo and safflower also gradually declined with the invention of chemical dye in the late nineteenth century.

The people had a very judicious system of land use. They artificially raised land which rose the general level of inundation contained the homesteads, the fruit trees and vegetable gardens. The physically higher land above inundation level was devoted to such crops as cotton and sugarcane. The lower and generally inundated areas were cultivated for rice, legume and indigo areas. The lowest lands were selected for aman rice of the floating variety. Aus rice lands were slightly higher than those of aman. Boro rice occupied the lowest lands near the creeks and rivers. Rabi crops such as oil

seeds, mustard, sesamum, linum and various pulses were grown on higher lands. Tea plantation was gradually introduced mainly in the Sylhet district because of soil and climate in the middle of the nineteenth century imported from China. The disappearance of the commercial crops of indigo and safflower was followed by the emergence during the late nineteenth century of Jute destined to dominate the economy of Bangladesh.

## **2.2 Present Land use Pattern**

The present land utilization statistics of Bangladesh by region for 1996-97 is shown in the following table <sup>(4)</sup> :

**Table -1**  
**Land utilisation statistics of Bangladesh by region 1992-93 to 1996-97**

Region	Total area	Not avail for cultivation	Forest area	Culturable waste	Current fallow	Single cropped area	Double cropped area	Triple cropped area	Net cropped area	Total cropped area
Bandarban	1107	137	637	232	30	42	23	06	71	106
Chittagong	2036	561	675	140	34	236	301	88	625	1102
Comilla	1660	451	02	14	20	273	695	205	1173	2278
Khagrachhari	667	194	357	57	20	21	13	05	39	62
Noakhali	1525	395	243	56	80	241	356	154	751	1415
Rangamati	1511	28	1380	09	-	70	19	05	94	123
Sylhet	3113	765	185	239	233	993	609	89	1691	2478
Dhaka	1838	779	64	23	32	395	400	145	940	1630
Faridpur	1726	470	-	33	65	363	615	189	1158	2133
Jamalpur	839	196	30	28	05	112	378	90	580	1138
Kishoreganj	1380	355	02	42	42	414	451	74	939	1538
Mymensingh	1078	324	39	09	01	128	496	81	705	1363
Tangail	844	64	124	09	05	250	311	81	642	1115
Barisal	2040	770	53	86	80	431	464	156	1051	1827
Jessore	1623	449	-	19	12	246	718	179	1143	2219
Khulna	3062	490	1426	96	75	675	260	40	975	1315
Kushtia	861	270	-	30	13	107	362	79	548	1068
Patuakhali	1245	292	72	10	07	544	281	39	864	1223
Bogra	960	318	-	04	07	72	428	131	631	1321
Dinajpur	1644	467	26	32	37	330	596	156	1082	1990
Pabna	1201	490	-	35	19	180	357	120	657	1254
Rajshahi	2333	696	07	27	50	810	629	114	1553	2410
Rangpur	2377	720	07	65	96	263	960	266	1489	2981
Bangladesh :	36669	9681	5329	1295	963	7196	9722	2483	19401	34089

**Note :**

(1) Total area of all regions have been reported by the Survey of Bangladesh.

(2) Forest figures have been reported from the office of the "Chief Conservator of Forest". Some adjustments have been made in Rangamati regions. Forest figures does not include private forest.

The land utilization for the whole of Bangladesh can be summarised in the following table <sup>(5)</sup>.

**Table-2**  
**Land Utilization in Bangladesh 1984-85**

(In million hectares)

Type of Land	Bangladesh	Percentage of total land
Land not available for cultivation	2.41	17
Forest	2.07	14
Cultivable waste	.23	2
Current fallow	.51	4
Net cropped area	9.05	63
Net cultivable area	9.56	67
Total Land Area	14.27	100

Source : National Water Plan - 1986, MPO

The table shows that 67% of the total land area of Bangladesh is cropped. The net cultivable area is comprised of the net cropped area which is 63 percent and the current fallow land which is 3.6%. 14% land is forest and seventeen percent used for urban and rural settlement, market places, roads, canals and water bodies.

## **ENVIRONMENT**

### **3.1 Climate**

Bangladesh has a sub-tropical monsoon climate. 80% of the rainfall occurs during summer monsoon months namely June to September. The winter and pre-monsoon seasons are quite dry. The winter months during November to February are pleasant with minimum temperatures between 7-12 degree C and maximum temperature of 24-31 degree C. The maximum temperature recorded in summer months is 37 degree C. The country has excess of rainfall during summer months whereas there is deficit of rainfall during the rest of the year. The average annual rainfall varies from 1429 to 4338 mm <sup>(6)</sup>. The country is devastated very often by severe flooding during the monsoon whereas droughts during pre-monsoon period are not uncommon. The country is frequently visited by severe tropical cyclones with immense loss of lives and property.

### **3.2 Topography**

The country comprises two sharply contrasting major physical divisions the vast alluvial plain and the marginal hills of the north east and south east. The country has been divided into thirty agro-ecological zones. For the purposes of understanding the kind of agricultural activities undertaken in the country, Bangladesh can be divided into three major physiographic units: hills, terraces and flood plains<sup>(7)</sup>.

#### **Hill Areas :**

The hill areas comprise the high hill and low hill ranges. These hills are steep to very steeply sloped and are subject to severe topsoil erosion owing to runoff. These areas also suffer from serious shortage of soil moisture in the dry season. The hill areas occur in the northern and eastern borders of the country in Khagrachari, Rangamati, Bandarban, Chittagong, Cox's Bazar, Patia, Sylhet, Maulavi Bazar and Habiganj. The hill soils are under the general soil type-the Brown Hill Soils. The natural vegetative cover for this region includes trees, shrubs and poor grasses while the plantation crops consist of timber, rubber, tea and horticultural fruits. In the valleys, however, some rice crops are cultivated.

#### **Terrace :**

The terraces in Bangladesh consist of the Madhupur and the Barind tracts and the Akhaura terrace. Generally, the terraces are broadly level to dissected lands with either good or bad drainage systems. The soil composition ranges from brown loamy to compact grey heavy clay soils. There is an acute shortage of soil moisture in the dry season. The Madhupur tract covers some areas of Narayanganj, Dhaka, Gazipur, Narsingdi, Tangail and Mymensingh. The Barind tract extends in the north Bengal region from the districts of Rangpur, Gaibandha, Dinajpur, Nawabganj, Bogra to Joypurhat, Natore and parts of Sirajganj. The Akhaura terrace comprises the Akhaura part in Brahmanbaria district. The soils of the terraces fall under the general soil types, Deep Red-Brown Terrace Soils, Shallow Red-Brown Terrace Soils, Brown Mottled Terrace Soils, Deep Grey Terrace Soils and Shallow Grey Terrace Soils. Cultivation of rabi crops in these areas is restricted due to shortage of soil moisture. On the well drained sites of the Madhupur tracts, trees such as the jackfruit and sal are mainly grown. On the poorly drained sites in the Barind tract, single transplanted Aman or Aus crops, followed by transplanted aman are the major crop types. Recently irrigated Boro crop has also been introduced.

### **Flood plains :**

The river flood plains which include the piedmont plains are classified as shallow flooded areas and deeply flooded areas. The shallow flooded areas generally occupy the higher sites in the landscape and are inundated to a depth ranging from a few centimetres to less than one metre during the monsoon. The soil is usually friable loam and the land remains dry during the winter season. The shallowly flooded areas of the river floodplains are found in areas of Khagrachari, Rangamati, Chittagong, Cox's Bazar, Sylhet, Maulavi Bazar, Habiganj, Sunamganj, Kishorganj, Netrokona, Panchagarh, Thakurgaon, Dinajpur, Bogra, Joypurhat, Natore, Rajshahi, Nowabganj, Noagaon, Pabna, Sirajganj, Nilphamari, Lalmonirhat, Rangpur, Kurigram, Gaibandha, Meherpur, Kushtia, Chuadanga, Jhenaidah, Magura, Narial, Jessore, Satkhira, Khulna, Bagerhat, Pirojpur, Jhalokhati, Barguna, Patuakhali, Barisal, Bhola, Comilla, Lakshimpur, Noakhali and Feni. A wide diversity of cropping patterns is followed depending on the dry season residual moisture and availability of irrigation facilities. Generally the following cropping patterns are followed : a) Aus/Jute followed by Rabi Crops, b) Aus/Jute followed by Transplanted Aman followed by Rabi Crops. Besides Kharif season paddy, Boro paddy may be grown with irrigation facilities on clay soils.

The deeply flooded areas occupy the lower sites in the landscape and are inundated from one metre to three and a half metres during the monsoon season. These areas are present in Sylhet, Maulavi Bazar, Habiganj, Sunamganj, kishoreganj, Netrakona, Mymensingh, Tangail, Jamalpur, Sherpur, Dhaka, Manikganj, Narayanganj, Narsingdi, Munsiganj, Faridpur, Goalunda, Gopalganj, Madaripur, Sariatpur, Brahmanbaria, Comilla, Chandpur, Lakshimpur, Noakhali, Feni, Natore, Nawabganj, Noagaon, Sirajganj, Pabna, Kushtia, Magura, Narial, Jessore, Khulna, Bagerhat, Pirojpur and Barisal. The cropping patterns followed in the deeply flooded areas are (a) Mixed Aus and Broadcast Aman followed by either Rabi crops or dry season follow, (b) Broadcast Aman followed by Khesari and Broadcast Aman-follow in the Rabi season. The pattern to be followed is dependent on the length of time needed for draining flood-water and the residual moisture status of the soil.

### **3.3 Soil**

Some 500 soil series have been defined <sup>(8)</sup> and they may be grouped into three broad categories namely hill soils, terrace soils and flood plain soils. The soil types are heavily influenced by the extent of flooding. The hill soils are brown, develop on slopes over sand stones, silt stones and shales with varying textures according to their parent rocks. They are highly acidic and depleted of calcium and magnesium. Phosphorous fixation is a major problem in the hilly soils. These tracks are difficult to irrigate and are highly susceptible to erosion. The terrace soils cover most of Madhupur and Barind tracts, mainly flat land with narrow to broad valleys. On the terraces, soils are strongly

acid to neutral in reaction and depleted of calcium and magnesium. These soils being typically higher than flood plain soils, good crops grow during rainy season. However, recently boro rice and other diversified crops are also grown by irrigation.

The flood plain soils are the most common and are formed from river deposits. Soil reactions are acid to alkaline, depending upon the origin and location. These soils are suitable to a wide variety of crops during flood season as well as in winter.

### **3.4 Nutrient**

When population pressure was less and the need for food could be met by a single crop culture, land could be left fallow as a major conservation strategy to regenerate mined nutrients to restore soil fertility. This agricultural activity was in harmony with the environment. With increase in population, pressure on the country's resources for meeting the increased demand led to the intensification of agricultural activity. More and more areas were brought under cultivation by clearing forests and reducing or abandoning the practice of keeping the land fallow. Due to increased cropping intensities, water logging, indiscriminate use of fertilizers and other chemicals and poor irrigation management, there has been extensive depletion of organic matter in the soil. More than 50% of cultivated soil contains organic matter below critical level. Annual depletion of nutrients in intensively cultivated areas ranges between 180 and 250 Kg/ha. Application of N-fertilizers alone over the years has resulted in considerable loss of productivity in almost all soils of the country <sup>(9)</sup>. The approximate Nutrient situations in Different AEZ are given in table-3 <sup>(10)</sup>.

**Table-3**  
**Approximate Nutrient Status in Different AEZ**

AEZ	N	P	K	S	Zn	B	Mg	Ph
AEZ 1: Old Himalayan Piedmont Plain	L	M	M	L	H	H	l	4.6-5.4
AEZ 2: Active Teesta Flood Plain	L	M	L	L	L	-	-	-
AEZ 3: Teesta Meander Flood plain	L	H	H	L	L	H	M	4.4-5.5
AEZ 4: Kartoya Bengali Flood plin	L	M	L	L	L	-	-	4.8-6.6
AEZ 5: Lower Atrai Basin	M	M	M	L	L	-	-	4.6-5.9
AEZ 6: Lower Purnabhaha Flood plain	M	M	H	L	M	-	-	5.5-7.0
AEZ 7: Active Brahmaputra- Jamuna Flood plain	L	L	M	M	M	-	-	
AEZ 8: Young Brahmaputra and Jamuna Flood plain	L	H	H	H	H	H	H	4.8
AEZ 9: Old Brahmaputra Flood plain	L	M	M	L	M	H	H	5.0-5.6
AEZ 10: High Ganges River Flood plain	L	L	H	L	L	H	H	
AEZ 11: High Ganges River Flood plain	L	L	H	L	L	H	H	6.1-8.0
AEZ 12: Low Ganges River Flood plain	L	L	H	H	M	H	H	6.0
AEZ 13a: Ganges Tidal Flood plain (non-saline)	L	L	M	M	L	H	H	5.3-6.4
AEZ 13b: Ganges Tidal Flood plain (Saline)	L	M	H	M	L	-	H	
AEZ 13c: Ganges Tidal flood plain (Sundarbans)	M	M	M	M	M	-	-	
AEZ 14: Gopalganj-Khulna Bil	M	L	M	-	-	-	-	5.5-6.6
AEZ 15: Arial Bil	L	M	L	L	M	-	-	4.5-6.5
AEZ 16: Middle Meghna River Flood plain	L	L	L	L	L	-	-	4.1-5.1
AEZ 17: Lower Meghna River Flood plain	L	M	M	L	L	-	-	5.0-8.3
AEZ 18a: Young Meghna Estuarine Flood plain (non-saline)	L	L	M	L	L	M	H	7.5

Contd...

AEZ	N	P	K	S	Zn	B	Mg	Ph
<b>AEZ 18b: Young Meghna Estuarine</b>								
Flood plain (Saline)	L	L	M	M	M	-	-	6.5-6.8
<b>AEZ 19: Old Meghna Estuarine</b>								
Flood plain	L	H	M	L	M	H	H	5.0-5.4
<b>AEZ 20: Eastern Surma-Kushiyara</b>								
Flood plain	L	L	M	M	H	H	H	4.5-5.1
<b>AEZ 21: Sylhet Basin</b>	M	L	L	L	H	-	-	4.9-6.0
<b>AEZ 22: Northern and Eastern</b>								
Piedmont plains	L	L	M	L	L	H	L	4.5-5.3
<b>AEZ 23: Chittagong Coastal</b>								
plain	L	M	L	-	M	-	-	4.5-5.7
<b>AEZ 24: St. Martin's Coral Island</b>	L	L	H	L	L	-	-	6.5-8.0
<b>AEZ 25: Level Barind Tract</b>	L	M	M	L	M	H	M	4.7-6.2
<b>AEZ 26: High Barind Tract</b>	L	L	L	L	M	-	-	4.8-5.8
<b>AEZ 27: North Eastern Barind</b>								
Tract	L	H	L	H	H	H	L	4.8-5.6
<b>AEZ 28: Madhupur Tract</b>	L	M	M	L	M	H	M	4.5-5.2
<b>AEZ 29: Northern and Eastern</b>								
Hill	L	L	L	L	M	-	-	4.7-5.2

Notes : L = low, M = medium, H= high, - = no information.

### 3.5 Land Degradation

Common categories of land degradation are erosion, water logging, salinity and depletion of nutrients. About 10% of the net cultivated land suffers from medium and high salinity in the dry season, another 10% in the hilly areas is considered highly eroded and over 50% of the total land has impeded drainage and suffers from water logging and poor aeration <sup>(11)</sup>.

Another area of environmental degradation linked to agriculture is the impact of toxicity from improper pesticide and fertilizer use . The greatest threat of toxic exposure is from the use of pesticide on vegetables which puts both vegetable producers and consumers at risk.

### 3.6 Water Resources Degradation and Pollution

The availability of water for crops is one of the most determining factors for increasing agricultural production. The major sources of water in Bangladesh are rainfall, river water and groundwater. Traditionally water management in Bangladesh

for agriculture has relied on rainwater and river flow. However, low lift pumps, deep tubules and irrigation canals have led to the utilisation of surface and ground water for agriculture during the dry season.

There is severe flooding during the summer where there is very little rainfall during winter and in the pre-monsoon period it is highly variable. Since the river flow of Bangladesh originates outside the national boundary and this river flow is greatly reduced with the stoppage of the rains, the main river flow during dry season is the natural and flow from the ground water reservoir. Most of this water drains into the sea. This affects adversely the rapidly diminishing surface water situation. During the dry season surface water decreases rapidly. This decrease is caused partly by evaporation from ponds, depressions and water stored in the pores. The national mean annual evaporation of 1040 mm is just about half the mean annual rainfall. The reservoir for groundwater in general have sufficient storage capacity to meet the yearly changes in rainfall and flooding which provide a dependable volume of groundwater for most uses.

### **3.7 Arsenic Pollution**

Bangladesh has possibly the largest concentration of underground tubewells used both for drinking and irrigation purposes. Serious arsenic contamination has been reported in large areas of Bangladesh and this has posed a very serious health hazard.

### **3.8 Atmospheric Pollution**

Five primary pollutants account for more than 90% of the air pollution. These are Suspended Particulate Matters (SPM), Carbon monoxide (CO), Nitrogen oxides (NO<sub>x</sub>), Sulphur oxides (SO<sub>x</sub>) and Hydrocarbons (HC).

The oxides of Sulphur in the environment come from burning of fossil fuel particularly from industries and power generation. But burning of sulfur containing fuel in automobiles is a significant source of SO<sub>x</sub> in the urban environment. A major source of emission of oxides of nitrogen is the motor vehicle exhaust. The primary emission sources of hydrocarbon include incomplete combustion of fossil fuels, evaporation losses from engines and storage areas.

There is severe atmospheric pollution in specially Dhaka city primarily because of uncontrolled emission of motor vehicles and other economic activities. The concentration of lead in particular in Dhaka city is

far higher than the permissible limit <sup>(12)</sup>. The lead is inhaled along with the air and is deposited deep in the lungs and enters the blood stream and this can cause various lung diseases and lower the IQ of children. There is also the problem of waste disposal.

## **ECONOMY**

### **4.1 Multisectoral production structure**

The share of different sectors in Bangladesh GDP is shown in the following table <sup>(13)</sup>.

**Table-4**  
**Bangladesh GDP Shares by Sector, 1973-94**

<b><u>Year</u></b>	<b><u>Agriculture</u></b>	<b><u>Industry</u></b>	<b><u>Services</u></b>
1972/73	49.8	13.6	36.7
1975/76	49.3	12.7	38.0
1980/81	44.2	15.3	40.5
1985-86	41.4	15.7	42.9
1990/91	37.6	17.2	45.2
1993-94	34.9	18.9	46.2

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Source : Bangladesh Bureau of Statistics and World Bank (1995a).

In 1972-73 agriculture dominated the economy, contributing about one-half of the country's GDP (Table 4). Over time the importance of agriculture declined, and by 1993-94 its share had fallen to about one-third, with the services sector dominating (46 per cent of GDP). The industrial sector's share of the economy remained fairly stable over the 20 year period, although it increased slightly, from 14 to 19 per cent. The sudden growth of services was led by rapid expansion in public administration, banking and insurance, utilities and professional services. While agriculture's share of GDP had declined, it remains very important to the economy.

The trend in the sectoral growth for 1981-1994 is given in the following table <sup>(14)</sup>.

**Table-5**  
**Trends in Sectoral and GDP Growth 1981-1994 (percent per year)**

	<u>1981-94</u>	<u>1987-94</u>	<u>1990-94</u>
GDP at market price	3.39	4.09	4.05
Agriculture	2.05	2.46	1.58
Manufacturing	3.99	5.27	6.71
Construction	6.30	4.99	4.76
Services	5.31	5.01	5.30

## 4.2 Input use

Modern irrigation and fertilizers have expanded a lot in recent times in Bangladesh which is shown in the following two tables <sup>(15)</sup>.

**Table-6**  
**Trends in Fertilizer Consumption in Bangladesh**

Period	Urea	TSP	MP	Total	Average
	(1000 metric tons of nutrient)				(lbs/acre)
1963-64	36.6	11.1	2.0	49.7	4.0
1970-71	99.2	35.0	10.4	144.6	10.0
1977-78	224.2	89.4	25.6	339.2	24.0
1978-79	219.9	83.0	29.0	331.9	23.0
1979-80	250.5	96.4	30.0	400.7	28.0
1980-81	282.0	100.5	27.6	420.0	28.0
1981-82	242.5	97.4	27.6	396.8	27.0
1982-83	289.4	94.8	30.6	458.3	31.0
1983-84	325.7	120.1	37.5	543.5	36.0

**Contd..**

**Annual growth rate :**

1963-64/					
1970-71	15.3	17.8	26.6	16.5	14.0
1970-71/					
1977-78	12.3	14.3	13.7	13.0	13.3
1977-78/					
1983-84	7.4	10.6	6.6	8.2	7.0

- Notes : 1) Total includes DAP for the years 1979-80 to 1983-84.  
 2) Nutrient conversion ratios are 0.46 for urea and TSP and 0.60 for MP.

**Table-7**  
**Expansion of Modern Irrigation in Bangladesh**  
**Over Time**

Years	Net Irrigated Area(1000 acres) by Modern Methods				Net irrigated area by modern methods as % of net cultivable area of Bangladesh
	<u>LLP</u>	<u>TW</u>	<u>Gravity Flow</u>	<u>Total</u>	
1969-70	742	80	82	905	4.1
1970-71	1032	119	83	1235	5.6
1971-72	830	84	58	972	4.4
1972-73	1165	93	64	1322	6.0
1973-74	1408	131	67	1606	7.3
1974-75	1442	234	67	1743	7.9
1975-76	1363	263	84	1710	7.8
1976-77	1232	234	92	1558	7.1
1977-78	1370	314	135	1819	8.3
1978-79	1434	396	157	1987	9.0
1979-80	1536	446	241	2223	10.0
1980-81	1645	548	303	2495	11.3
1981-82	1740	670	322	2731	12.4
1982-83	1844	1018	377	3240	14.7
1983-84	1647	1648	609	3903	17.7

### **4.3 Prices, Subsidies and taxes**

The overall supply of agricultural credit expanded very sharply in recent times from Tk. 55 million in 1960-61, it rose to Tk. 16,500 million in 1990<sup>(16)</sup>.

Agriculture contributes significantly to government revenues through direct taxation on agricultural incomes and taxes on agricultural commodity trade. Food subsidies generally represent only a small share of the total government expenditure. It was about 5% of the total budget in 1990-91.

## **SOCIETAL**

### **5.1 Population**

Districtwise Household and population of Bangladesh is shown below (according to 1991 census) in Table-8<sup>(17)</sup>.





## 5.2 **Income Distribution**

Division and Nation-wide per capita expenditure and per capita calorie consumption are shown in the tables 9 & 10 <sup>(18)</sup>.



### **5.3 Migrations**

Migrations has taken place in Bangladesh through the ages. Bengalees are very much a mixed race. Turkish, Persian, Arabian and even European influences are noticeable. However, partition of the subcontinent and the British Province of Bengal into East Bengal and West Bengal in 1947 witnessed large scale migration. Hindus moved from East Bengal to India and Muslims from India to East Bengal (now Bangladesh). In this process, the migration of Hindus from East Bengal had a serious repercussion on the overall agricultural economy of East Bengal <sup>(19)</sup>. Middle and upper Middle class Hindus had been prominent in both Agriculture and commerce and they customarily supplied capital to the rural farmers. In addition, there was a substantial group of Hindus money lenders who provided cash in return for crops. After the Hindu money lenders migrated to India, working capital for farmer became scarce. On the otherhand, incoming Muslims from India further aggravated the economic situation. They were largely non-farming city people who concentrated mainly in the urban areas to work in the few factories existing at that time. This situation made demand upon land more acute and food production fell far short of the actual need. In short, the situation became worse after 1947. However, the situation improved gradually. In recent times, migration is taking place from countryside to the cities. The severe river erosion and other economic considerations are largely responsible for this. The Dhaka population has swelled to about 10 million from a bare 1 million some thirty years ago.

### **5.4 Development of Land Tenure**

During the ancient period, the land system was characterized by undisputed right of the farmer to the land he cultivated, as enuuciated in ancient Hindu cultures ®. As long as the cultivator was able to pay the revenue to the state, he had the right to occupy the land and could in no way be evicted from the land.

During the Muslim period also, same position continned. However with the British annexation of Bengal in 1757 drastic changes occurred in land tennure system. New land system was introduced and cultivation of jute and tea was emplazied. The British crown appointed Lord Corwallis as the Governor General in 1786. It was alleged that the real purpose of his appointment was to create a class of landed aristocrats who apart from being loyal to the crown, would also devote time and energy to good husbandry, after the manner of ‘gentlemen farmers’ of England. But it did not happen that way.

Instead the celebrated Permanent Settlement of Lord Cornwallis declared the landlords (zaminders) hereditary proprietors of land on a perpetually fixed land revenue with absolute rights of transfer by means of sale, bequest or otherwise. No limit was put to the right of the landlord to exact a high rent from the cultivating tenants and no provision was made to protect their rights and privileges. After the independence of the subcontinent, the Zamindari system was abolished in Bangladesh and the East Bengal Tenancy Act was passed in 1950. Redistribution of land was one of the major objectives of the Act, but the ceiling was so high that not much land could be made available.

A state landlordism has replaced the private zamindars. Based on monopoly ownership and control over land, the rural rich have further consolidated their dependency relationships vis-à-vis wage labourers, share croppers, marginal farmers and creditors. This in turn, helped the rural rich to easily translate their economic power into political power in the countryside <sup>(20)</sup>.

The total land area of Bangladesh is approximately 35 million acres. Of this, two-thirds is under cultivation. No other country in the world has such a high percentage of its land area under cultivation. The remaining third covers waterways, settlements, roads and forests. Fallow land as a proportion of total land area is less than 3 per cent. The total availability of land has remained largely unchanged over the last twenty-five years. During this period, population has increased from 70 million to 120 million. Per capita land availability today is under 20 decimals. At the beginning of the twentieth century, there was one person to each acre of land. Today, there are five persons to each acre of land and if the present population growth trend continues, this could rise to as much as eight persons by the end of the century. Land scarcity and landlessness are integrally linked. According to land whatsoever, neither homestead nor arable. By adding those who own homesteads but no arable land, the proportion of landless rises to 28 per cent. However, the common definition of landlessness also includes those considered functionally landless, that is those owning up to 50 decimals only. Accordingly to this definition, total landlessness stands at 56 per cent.

## **5.5 Health**

Proportional Morbidity and Prevalence of morbidity per one 1000 population by symptoms/diseases is shown in table-11 <sup>(21)</sup>.

**Percent of deaths from top 15 diseases are shown in table-12 <sup>(21)</sup>.**

## 6. **Population Growth**

The following table gives the population growth figures of Bangladesh <sup>(22)</sup>.

**Table -13**  
**Population Statistics of Bangladesh**

<b>Census Year</b>	<b>Male (million)</b>	<b>Female (million)</b>	<b>Male : Female ratio</b>	<b>Urban (million)</b>	<b>Rural (million)</b>	<b>Total (million)</b>
1961	26.40	24.50	1.08	-	-	50.84
1974	37.07	34.41	1.08	6.27	65.20	71.48
1981	44.92	42.20	1.06	13.23	73.89	87.12
1991	57.31	54.14	1.06	20.87	85.44	111.45

Source : Bangladesh Bureau of Statistics, 1994

7. Table-14 gives indicators of the Energy sector<sup>(23)</sup>

## **8. Life Styles**

The following table (**Table-15**) <sup>(24)</sup> shows imports by broad commodity groups, which shows a continuous increase in the items indicating an improvement in the life style of people. There has been a significant improvement in the rural communication facilitating rural urban interactions.

## 9. Extreme events

Bangladesh is extremely vulnerable to natural calamities like tropical cyclones and floods which cause immense loss of lives and damage of billions of dollars hampering the growth rate of the country. The following two tables show the major list of floods and cyclones affecting the country <sup>(25)</sup>.

**Table-16**  
**Cyclone affecting Bangladesh since 1960**

Date	Max. wind speed in Kms/hr	Storms surge ht. (in ft.)	Deaths
-----	-----	-----	-----
09 Oct. 1960	162	10	3,000
30 Oct. 1960	210	15-20	5,149
09 May 1961	146	8-10	11,466
30 May 1961	146	20-29	-
28 May 1963	203	14-17	11,520
11 April 1964	-	-	196
11 May 1965	162	12	19,279
31 May 1965	-	20-25	-
14 Dec. 1965	210	15-20	873
01 Oct. 1966	146	15-30	850
11 Oct. 1967	-	6-28	-
24 Oct. 1967	-	5-25	-
10 May 1968	-	9-15	-
17 April 1969	-	-	75
10 Oct. 1969	-	8-24	-
07 May 1970	-	10-16	-
23 Oct. 1970	-	-	300
12 Nov. 1970	223	20-30	5,00,000
08 May 1971	-	8-14	-
30 Sep. 1971	-	8-14	-
06 Nov. 1971	-	8-18	-
18 Nov. 1973	-	8-13	-
09 Dec. 1973	122	5-15	183
15 Aug. 1974	97	5-22	-
28 Nov. 1974	162	7-16	a few
21 Oct. 1976	105	8-16	-
13 May 1977	122	-	-
10 Dec. 1981	97	06	02
15 Oct. 1983	97	-	-
09 Nov. 1983	122	-	-

<u>Contd..</u>			
Date	Max. wind speed in Kms/hr	Storms surge ht. (in ft.)	Deaths
-----	-----	-----	-----
03 June 1984	89	-	-
25 May 1985	154	10-15	11,069
29 Nov. 1988	162	5-10	2,000
29 April 1991	140	20-25	1,38,000
02 June 1991	100	06	-
02 May 1994	200	-	170
19 May 1997	225	15	126
26 Sept. 1997	150	10	70
20 May 1998	120	-	03

**Table-17**  
**Area affected by flood in Bangladesh**

Year	( thousand Sq. Km. )
-----	-----
1954	36.4
1955	49.9
1956	35.1
1960	28.2
1961	28.4
1962	36.9
1963	42.5
1964	30.7
1965	28.2
1966	33.0
1967	25.3
1968	36.3
1969	41.0
1970	42.0
1971	35.8
1972	20.5
1973	29.4
1974	52.0
1975	16.4
1976	27.9
1977	12.3
1978	10.8

**Contd..**

Year	( thousand Sq. Km. )
-----	-----
1980	32.5
1982	3.1
1983	11.0
1984	27.9
1985	11.3
1986	3.1
1987	56.6
1988	81.8
1989	6.1
1990	3.5
1991	28.6
1992	2.0
1993	28.7
1994	0.42
1998	85.0

-----  
**Source : BWDB**

## 10. Macro-economic indicators

Some of the macro-economic indicators of Bangladesh are given in the following table

**Table-18**  
**Macroeconomic indicators of Bangladesh : 1949-1993**

<u>Period</u>	
<b>Growth rate of real agricultural output (%)</b>	
1949-55	1.6
1956-60	0.8
1960-65	3.1
1965-70	3.1
1971-80	3.4
1981-90	2.4
1991-93	3.6
<b>Growth rate of real manufacturing output(%)</b>	
1949-55	7.7
1956-60	8.0
1960-65	5.8

**Contd..**

1965-70	7.4
1971-80	11.9
1981-90	5.6
1991-93	5.8
<b>Growth rate of real GNP/GDP(%)</b>	
1950-55	2.4
1955-60	1.8
1960-65	4.6
1965-70	3.4
1971-75	-
1976-80	5.2
1981-85	3.8
1986-90	4.1
1991-93	4.0
<b>Inflation rate (%)</b>	
1950-55	-2.4
1956-60	7.1
1961-65	2.3
1966-70	4.1
1971-75	33.2
1976-80	8.2
1981-85	11.9
1986-90	9.6
1991-93	8.6

## **11. National Policy Measures and Directives**

National economic policy aims at poverty alleviation, creation of jobs and increase of the economic growth rate. In the Annual Development Plan of 1998-99, the estimated expenditure is 11.5% more than that of 1997-98 <sup>(27)</sup>. The dependence on external aid is being reduced gradually.

## **12. External Drivers**

Under the current globalization policy the patterns of land use may change drastically. More and more land is likely to be put to use to produce those agricultural products which are demanded in foreign markets and which will definitely attract more remunerative prices.

Climate Change and Sea level rise could have serious consequences on Land Use and Land Cover Changes.

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