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BANGLADESH  
Quarterly  
Economic  
Update

September 2008

Asian Development Bank

Bangladesh Resident Mission  
Asian Development Bank

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September 2008

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The logo of the Asian Development Bank (ADB), consisting of the letters 'ADB' in white serif font on a black square background.

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BANGLADESH

# Quarterly Economic Update

September 2008

Asian Development Bank

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## NOTES

- (i) The fiscal year (FY) of the Government ends on 30 June.
- (ii) In this report, "\$" refers to US dollars.

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## MACROECONOMIC DEVELOPMENTS

### Highlights

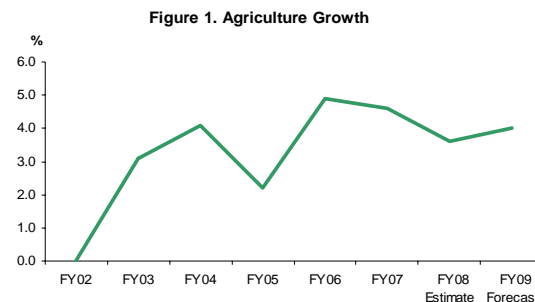
- Macroeconomic outlook for FY2009 remains generally favorable with reasonable growth prospects and stable external balances.
- Gross domestic product (GDP) growth projected at 5.5% to 6.0% in FY2009.
- Export and remittance growth may slow, but should remain reasonably robust in the absence of a deep and prolonged global recession.
- Because of its limited exposure, the financial sector including the domestic capital market will remain largely unaffected by the global financial crisis.
- Revenue outturn will remain robust unless economic activity and imports experience a major slowdown.
- Inflation will remain within the earlier projected 9%.
- Pressures on the current account will remain manageable and foreign reserves comfortable.

### Sector Performance and Economic Growth

1. The Bangladesh economy has demonstrated great resilience in recent times. Recovering from natural calamities and external oil and commodity price shocks, GDP growth of 6.5% was initially projected for FY2009, aided by robust agriculture and manufacturing growth, and sustained expansion of the services sector. In the wake of the global financial crisis, the country, with its high dependence on exports and remittances, may have difficulty attaining this growth target. Growth in the range of 5.5% to 6.0% would be more reasonable considering the effects of the financial crisis on external and domestic demand. Bangladesh will need to improve the investment climate, upgrade infrastructure, and accelerate economic reforms to achieve higher economic growth, create jobs, and sustain progress in poverty reduction.

#### Agriculture

2. In FY2009, agriculture's growth target is 4.0%, up from actual growth of 3.6% in FY2008 (Figure 1).



Production of rice and wheat for FY2009 is targeted at 34.3 million tons (rice, 33.3 million tons and wheat, 1 million tons), a 15.1% rise from actual production in FY2008. Although this target looks ambitious, favorable weather conditions, expansion of cultivable land, use of high-yielding seeds, and various government support programs are likely to contribute to quantum growth in food-grain production in the current fiscal year. The poultry subsector seems to have recouped losses caused by the outbreak of avian flu in FY2008. The fishery subsector is also expected to post robust growth because of growing demand and improved competitiveness.

3. Total cultivable land for the *aus* (summer) and *aman* (monsoon) rice crops was targeted at 6.9 million hectares (*aus* 1.1 million and *aman* 5.8 million hectares) during FY2009. This is a 16.9% rise over FY2008. The production target for *aus* is fixed at 2.3 million tons, 53.3% higher than actual production in FY2008. According to a preliminary estimate by the Department of Agriculture Extension, *aus* production was at 1.9 million tons, an increase of 26.7% over actual production in FY2008. The production target for *aman* is fixed at 13.0 million tons for FY2009, a 34.0% rise over actual production in FY2008. *Aman* has been cultivated on 6.1 million hectares of land compared with the target of 5.8 million hectares for the fiscal year. In 20 districts, 0.17 million hectares of land for *aman* cultivation were affected by short-lived annual floods. Timely government post-flood rehabilitation assistance and local farmers' response have largely mitigated the flood damage. The latest information on the ongoing *aman* harvest indicates that the production target could be achieved. In FY2009, the production target for the *boro* crop is set at 18.0 million tons, a 1.1% rise from actual production in FY2008. Attaining this target will require improving input supply arrangements, timely and adequate availability of agricultural credit, and favorable prices for farmers.

4. The production target for wheat in FY2009 is 1 million tons, 25.0% higher than actual production in FY2008. Attaining this target will largely depend on the duration of the winter season. A prolonged winter will have favorable impacts on wheat and other seasonal crops, especially winter vegetables. Last year's bumper production of maize and potatoes is also likely to be sustained in FY2009, despite continued potato storage problems.

5. The Government's food procurement program in calendar year 2008 was satisfactory. The Government had

set a procurement target of 1.5 million tons of boro paddy and rice; boro procurement was 1.1 million tons, about 73.0% of the target. The modest spread between the Government's procurement price and the open market price created some temporary disruption in the procurement program.

6. Up to October 2008 of FY2009, the total (public and private) import of food grains was 0.8 million tons (0.4 million tons of rice and 0.4 million tons of wheat), compared with total imports of 1.2 million tons (0.5 million tons of rice and 0.7 million tons of wheat) in FY2008. The public sector import target for food grains is 1.3 million tons in FY2009, comprising 0.5 million tons of rice and 0.8 million tons of wheat. Up to October, a total of 0.5 million tons of food grains (0.4 million tons of rice and 0.1 million tons of wheat) was imported. In addition, 0.05 million tons of food aid (0.02 million tons of rice and 0.03 million tons of wheat) was received up to October. Over the same period, private imports were 0.3 million tons (0.02 million tons of rice and 0.23 million tons of wheat).

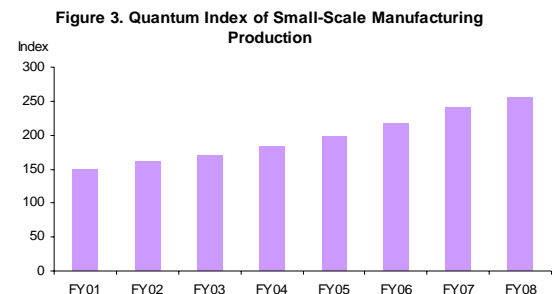
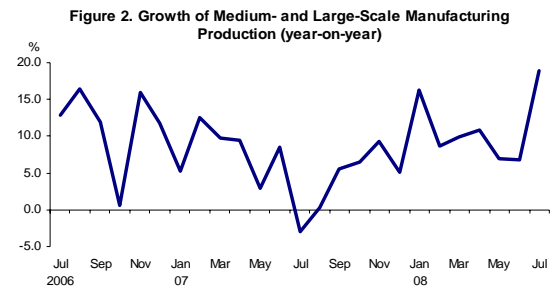
7. Because of rising food prices and supply shortages, the Government has resorted to public distribution of food grains. The initial FY2009 distribution target for the Public Food Distribution System was 2.9 million tons (1.6 million tons through monetized channels and 1.3 million tons through nonmonetized channels). Actual distribution at the end of October 2008 was 0.5 million tons.

### Industry

8. In FY2009, industrial growth was originally targeted at 7.9% compared with 6.9% in FY2008. Continued growth in readymade garment production, together with improvements in business confidence and recovery of housing and construction, stimulated industrial activity in the first quarter of FY2009.

9. The general index of industrial production (medium- and large-scale manufacturing) rose sharply by 18.9% in July 2008 over the same month of the previous fiscal year (Figure 2). The industries recording higher growth include textiles and leather (37.3%), basic metals (16.5%), furniture (11.2%), nonmetallic products (10.5%), and fabricated metals (5.3%). The general index of small-scale manufacturing industries rose by 5.8% in FY2008 (Figure 3).

10. A slump in construction activity throughout FY2008, because of the Government's anticorruption drive and



higher global prices of construction materials, appeared to be reversing in the first quarter of FY2009. Falling prices of construction materials in international markets and a rise in demand for real estate because of growth in bank credit and higher remittances helped to revive the construction subsector. Because of the unfolding global financial crisis, industrial growth in Bangladesh will likely be lower than earlier projections, as reduced demand for Bangladesh goods internationally and the moderation in domestic demand caused by the likely slowdown in remittance growth will prompt consumers to become more cautious with their spending, but should remain reasonably robust in the range of 6.7% to 7.2% in FY2009.

11. To sustain rapid industrial growth, the country needs to urgently address shortages in power and gas supplies. Unless early remedial measures are adopted, frequent power cuts and irregular supplies will continue to affect industrial production. The small- and medium-scale industries, which are unable to afford their own generators, will be more severely affected by the power shortages. The lack of gas supply will also constrain new investment in manufacturing activities. Large and quick investments in gas and power are essential to ensure their availability and thus critical for the country's industrial development. Investment in other infrastructure, such as in improving road conditions, port operations, and urban infrastructure and services, is also essential for the country's rapid industrial development.

12. Bangladeshi producers also need to raise productivity to maintain long-term export competitiveness. Productivity can be improved with process reengineering, investment in modern technology and machinery, and labor skills development. Bangladesh currently equals or outperforms India in flexibility with orders, quality, and price. But India outperforms Bangladesh in innovation and design services, compliance with labor standards, consistency and reliability, and delivery time. To improve in these areas, Bangladesh needs an adequate supply of skilled managers and workers, and investments in basic textiles, the critical backward linkage industry for woven garments. Regional cooperation among South Asian countries can play a pivotal role in training managers, quality control and technical personnel, and designers.

### **Services**

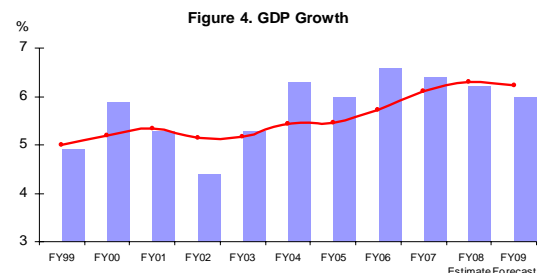
13. The services sector accounts for about half of Bangladesh's GDP. Growth in the sector is driven by demand for services linked to agricultural and industrial

expansion. In FY2009, the sector's growth target was originally set at 6.8%, a marginal increase from 6.7% in FY2008. Sector activities, especially wholesale and retail trade and transport, telecommunications, and real estate and housing performed well in the first quarter of FY2009. The continued expansion of agriculture and industry is likely to have a positive impact on services sector growth. In addition, during the upcoming parliamentary and upazila elections, retail trade is likely to benefit from further demand stimulus. Continued rapid growth in the mobile phone market and an increasing number of health care service providers are contributing to robust sector growth. Profit margins of private sector banks remain quite healthy, and are likely to have a positive effect on growth of financial services. However, the global financial crisis will have an adverse impact on the services sector because of effects on industry, particularly related to exports and compression of domestic demand in general. Sector growth in FY2009 is now projected at 5.7% to 6.2%.

### Economic Growth

14. Bangladesh's growth performance has been remarkably resilient despite multiple natural disasters and some erosion in business confidence. Real GDP growth in FY2008 remained strong at 6.2%, supported by a strong pickup in domestic economic activity in the second half of FY2008 and rapid growth in garment exports and remittance inflows. Before the onset of the global financial crisis, a 6.5% growth target for FY2009 appeared reasonable. But as the financial crisis in the advanced economies unfolds and recession sets in, the FY2009 growth projections for Bangladesh will likely need to be adjusted downward to between 5.5% and 6.0% (Figure 4), taking into account the likely effects on external and domestic demand. Although exports and remittances (paras. 40 and 44) are unlikely to be hard hit at the beginning of the financial crisis, they may slow somewhat. The drop in consumer spending in importing countries, because of income loss and looming economic uncertainties, will have moderating effects on demand for textiles (76% of Bangladesh's exports), and more pronounced impacts on high-end products such as frozen foods and leather products, which together make up the bulk of Bangladesh's exports. Possible moderation in remittance flows will also affect growth by reducing domestic consumption and investment demand.

15. Maintaining high growth in the face of the global financial crisis will be a challenge. To attain sustained higher economic growth, Bangladesh needs to



substantially increase investment, which has followed a declining trend (ratio of investment to GDP decreased from 24.5% in FY2005 to 24.2% in FY2008) in recent years. To enhance the economy's productive capacity, public investment needs to be increased by accelerating implementation of the annual development program (ADP). As climate change is likely to pose a major threat to economic growth in Bangladesh in the medium term, climate change concerns must be integrated into the country's economic development plans and activities (paras. 51–73). Although a successful transition to a new political government could create better conditions for private investment and the country's business environment, economic activity could slow during the transition and affect the FY2009 growth outlook. The new government must ensure sound macroeconomic management to set the economy on a higher growth trajectory.

16. Creating enabling conditions for investment and business is another major challenge to sustaining private sector-led economic growth. While the formation of the Better Business Forum to improve conditions for conducting business and the Regulatory Reforms Commission to streamline and upgrade the regulatory and legal framework governing business and private investments was timely, implementation of their recommendations deserves greater attention from the authorities to improve the enabling environment in Bangladesh.

17. Continued rapid economic growth is also critical for generating employment to absorb the country's fast-growing labor force and reduce poverty. According to a study of the International Labor Organization, Bangladesh is 12th among the top 20 countries in the world where unemployment is rising. The number of unemployed in Bangladesh is estimated at 30 million and the country needs to create an estimated 7.3 million additional jobs in just 3 years, beginning from FY2009, to absorb new entrants to the labor force. Given the rate at which unemployment is growing, the number of unemployed could reach 60 million by 2015, if adequate job opportunities are not created.

## **Inflation**

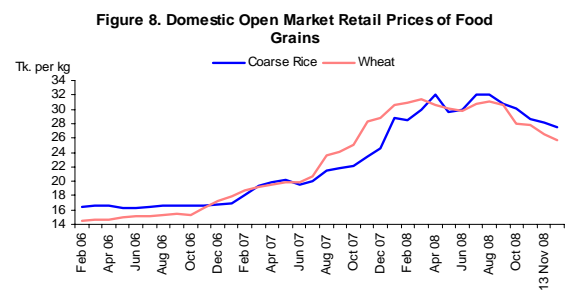
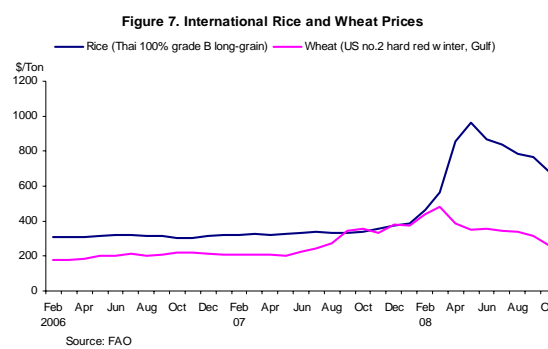
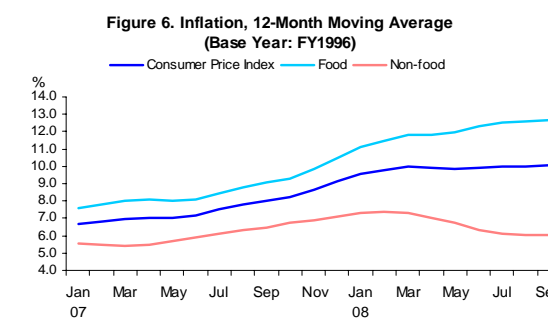
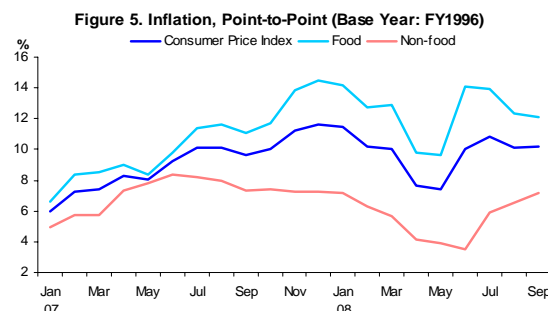
18. On a point-to-point basis, inflation rose marginally to 10.2% in September 2008 from 9.6% in September 2007. While food inflation rose to 12.1% from 11.1% in September 2007, nonfood inflation declined to 7.2% from

7.4% in September 2007 (Figures 5 and 6). The lagged effects of rising international commodity prices and the large adjustment in domestic fuel prices contributed to the rise in inflation. In addition, inflation expectations played a role in pushing inflation upward. The fall in international commodity prices has not yet been fully transmitted to the domestic market (Figures 7 and 8).

19. In the coming months, inflation will depend on several factors. Personal spending may rise during the forthcoming national and upazila elections, creating upward price pressures; but the sharp decline in international commodity and intermediate goods prices should reduce domestic prices. However, imports may also decline as importers adopt a cautious approach in opening letters of credit, fearing that they will sustain losses if domestic prices turn out to be lower than import prices. This may lead to supply shortages that could generate price pressures. Supply shortages of imported raw materials and intermediate goods in particular may result in chain effects in terms of lower economic activity and higher prices. In addition, if the taka comes under pressure leading to its depreciation because of a strengthening dollar, it may again generate inflationary pressures. However, international prices are expected to soon stabilize at lower levels, which will help reduce inflationary pressures. For example, global rice production for 2008/09 is projected at a record 433.2 million tons (milled), almost 1% above the 2007/08 crop.<sup>1</sup> In the coming months, downward pressures are expected on rice prices, especially if wheat prices keep falling.<sup>2</sup> The likely good domestic crop harvests will also dampen inflationary pressures. Thus, inflation in FY2009 is likely to remain within the earlier projected rate of 9%.

## Fiscal Management

20. Revenue collection by the National Board of Revenue (NBR) rose by 18.8% in the first quarter of FY2009 over the corresponding period of FY2008 (Figure 9). NBR's vigorous tax collection efforts contributed to the impressive revenue performance. Sustaining this will depend on continued strong private sector activity in the face of the global financial crisis and the likely decline in value of imports caused by the fall in international



<sup>1</sup> United States Department of Agriculture. October 2008.  
<sup>2</sup> Food and Agriculture Organization (FAO). 2008. *Asia Pacific Food Situation Update*. Bangkok: FAO Regional Office for Asia and the Pacific.

commodity prices. Revenue collection may also slow during the national election period.

21. Import-based taxes during July–September 2008 rose by 27.4%, aided by higher customs duty (17.7%), value-added tax (VAT, 35.1%), and supplementary duty (42.9%) collections. Despite reductions or exemptions of customs duties on some essential imports—rice, wheat, sugar, pulses, peas, ginger, and spices—revenue at the import stage rose because of higher import volumes, aided by the decline in international commodity prices.

22. Domestic indirect taxes grew by 14.7% during the first quarter of FY2009. Domestic VAT (20.1%) recorded robust growth, while supplementary duties rose modestly (7.7%). To improve VAT collections, the efficiency of audits needs to be improved and registration procedures simplified. Updating and modernizing the VAT legislation is also essential for improving tax system productivity.

23. Income tax collections posted modest growth of 10.4% during July–September 2008. In recent years, income tax growth has been mainly driven by improved taxpayer compliance and collection of tax arrears. Bangladesh has the lowest direct tax (mainly income tax) effort among comparator South Asian countries because of the narrow tax base, which is further eroded by exemptions and evasion.

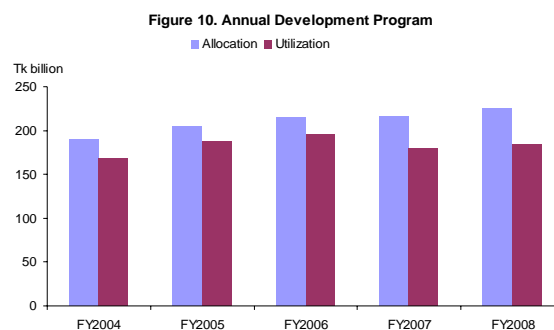
24. Ongoing tax reforms, including expanding taxpayer registration, modernizing NBR along functional lines, and strengthening audit functions are necessary to improve tax performance. Lists of tax exemptions, exclusions, and incentives need to be reviewed and pared down to expand the tax base and increase tax collections. Tax administration should be made more results focused with updated and simplified administrative systems.

25. To generate more revenue, the tax base needs to be broadened, and tax rates rationalized by unifying marginal corporate tax rates and fixing a reasonable rate. The preparatory work for separating tax policy from administration has been completed and a new policy unit is expected to be functional soon. The placing of the two large taxpayer units under a single member at NBR is expected to strengthen enforcement. The new universal self-assessment, expansion in registration and efforts to educate taxpayers, and improved taxpayer compliance contributed to revenue gains in FY2008 and the first quarter of FY2009.

Figure 9. Revenue Collection by NBR (July–September)



26. In FY2009, public spending is projected to rise by 16.1% over the revised FY2008 estimate, with current spending rising by 15.5% and ADP spending by 13.8%. The public spending to GDP ratio is projected to rise marginally from 15.9% in FY2008 to 16.0% in FY2009. ADP implementation in the past years has been hindered by weak institutional capacity and delays in project formulation (Figure 10). Natural calamities and efforts to reduce corruption in project implementation also slowed ADP utilization. Capital spending needs also to be stepped up by addressing capacity constraints and better interagency and aid coordination, so that infrastructure provision can support increased private investment and help address the country's development needs.



27. The fiscal deficit projected for FY2009 is 4.9% of GDP, up from 4.7% in FY2008. In financing the deficit, domestic bank and nonbank borrowing will meet the equivalent of 2.7% of GDP, and foreign loans and grants will account for the remaining 2.2%. Interest payments on domestic and foreign debt will fall from 19.8% of revenue in FY2008 to 18.1% of projected revenue in FY2009. During July-August 2008, deficit financing amounted to Tk16.3 billion compared with a surplus of Tk7.2 billion during July-August 2007. Net foreign financing stood significantly higher at Tk15.7 billion during July-August 2008 against Tk1.9 billion during July-August 2007. Domestic borrowing amounted to Tk0.6 billion compared with a negative borrowing (because of repayment) of Tk9.2 billion during July-August 2007. Higher domestic borrowing needs to be kept in check to minimize crowding out effects on private investment and control inflationary pressures. Enacting the public resources and budget management ordinance to set a cap on domestic borrowing will be useful in controlling domestic borrowing. Growth in current spending needs to be controlled to keep the fiscal deficit within the projections.

28. The losses of state-owned enterprises (SOEs) and associated quasi-fiscal obligations also pose significant fiscal risks. The administratively set prices of fuel, electricity, and fertilizer cause the bulk of the SOE losses. To reduce fiscal pressures, the numerous direct and quasi-fiscal subsidies to SOEs should be reexamined as the growing costs pose a serious threat to efficient fiscal management. Continued subsidization creates major moral hazard problems, particularly in the absence of comprehensive enterprise reforms.

29. In FY2008, losses of the Bangladesh Petroleum Corporation (BPC), Bangladesh Power Development

Board, Bangladesh Chemical Industries Corporation, and Bangladesh Biman were around 3% of GDP. Budgetary transfers covered 60% of the losses of the major SOEs with bank loans covering the rest. The BPC losses alone are estimated at \$916 million or 1.2% of GDP in FY2008. The quasi-fiscal costs arise from government guarantees for loans negotiated by BPC from domestic and international banks. The large rise in domestic fuel prices in July 2008, although subsequently somewhat reduced after the fall in international prices, will reduce BPC losses.

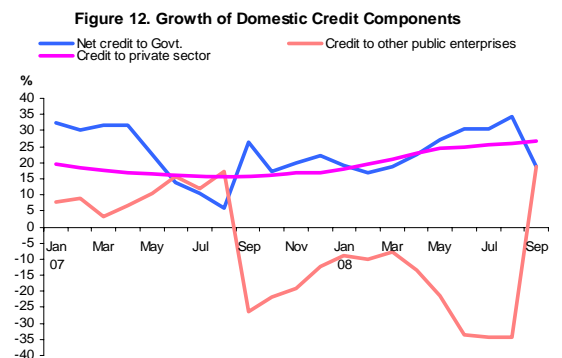
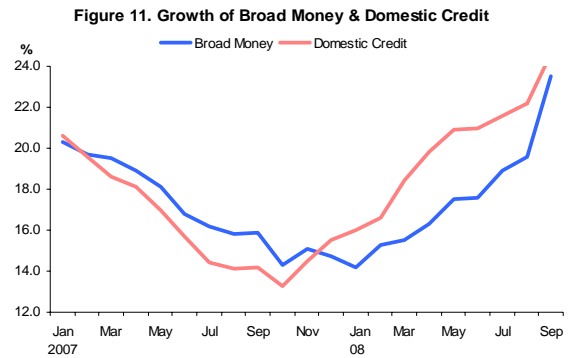
30. The fertilizer subsidy is also causing fiscal pressures, although prices were adjusted in June 2008 for the first time in 12 years. Subsidizing fuel and fertilizer limits development spending opportunities and diverts funds away from infrastructure development and poverty reduction. Removing subsidies will reduce fiscal and quasi-fiscal burdens and allow more public funds for economic development. Further, funding subsidies through bank borrowing is much more inflationary than passing on increases in international prices to domestic consumers. Cutting subsidies may require the strengthening of safety nets to reduce hardships on the poor.

### Monetary and Financial Developments

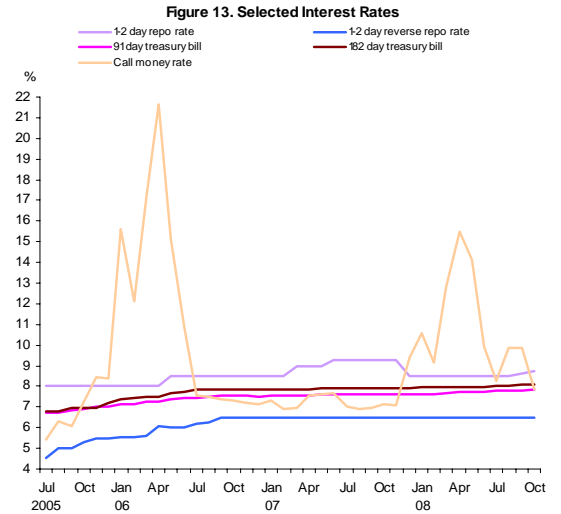
31. Broad money grew at 23.5% year-on-year in September 2008 up from 15.9% in September 2007 (Figure 11). The expansion was driven by high growth in domestic credit at 24.6%, although the growth of net foreign assets (11.5%) moderated because of the large sale of foreign exchange in the interbank market by Bangladesh Bank. Reserve money rose by 31.5% year-on-year in September 2008, up from 14.3% in September 2007 because of the sharp rise in net domestic assets (74.8%) of Bangladesh Bank. The reserve money multiplier was 4.5 in September 2008, which was lower than 4.8 in September 2007.

32. Private sector credit grew rapidly at 26.6% year-on-year in September 2008 because of the expansion in credit and advances by private sector banks for trade, commerce, industry, and consumer credit, up from 15.8% in September 2007. Net credit to Government rose by 18.8% year-on-year in September 2008 compared with 26.2% in September 2007; credit to the rest of the public sector also rose sharply (18.7% compared with -26.4% in September 2007, Figure 12).

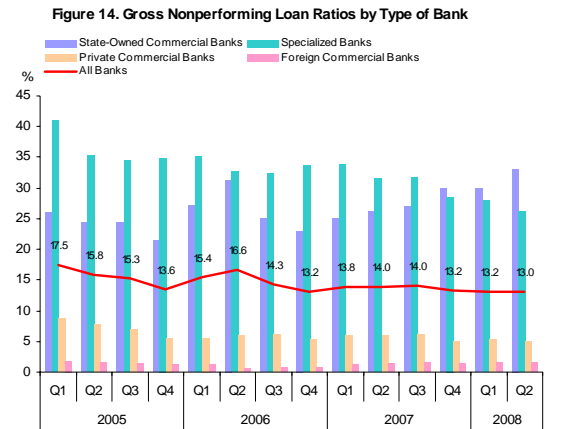
33. Bangladesh Bank conducted regular auctions of its 91-day and 182-day treasury bills, with their yields rising



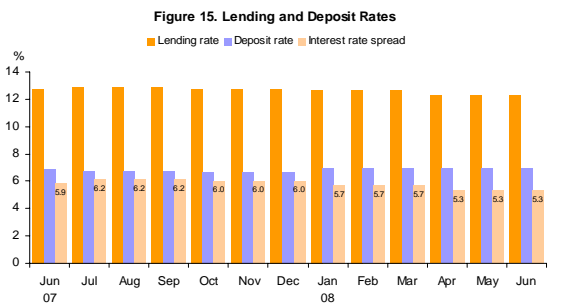
moderately to contain inflation for maintaining currency stability by reducing excess liquidity, although the auction of shorter duration 28-day treasury bills remained suspended during the first quarter of FY2009. Auctions of both repo (repurchase agreement) and reverse repo were held. While the reverse repo rates (1–2 day tenure) remained unchanged at 6.5% between June and the middle of November 2008, repo rates for identical tenures were raised from 8.5% to 8.75% in September 2008 suggesting the presence of credit demand from the commercial banks. Reverse repo rates were also raised to 6.75% later in November 2008, to restrain credit growth. The call money rate in September 2008 remained at 9.9%, the same level as in June 2008. The weighted average yields on 91-day and 182-day treasury bills showed upward pressures in October 2008 (Figure 13).



34. Gross nonperforming loans (NPLs) of all banks fell to 13% at the end of June 2008 from 14% a year earlier. But NPLs of the state-owned commercial banks (SCBs) rose from 26.2% to 33.1% during the period, although NPLs of specialized banks declined from 31.4% to 26.2% (Figure 14). The risk-weighted capital asset ratio (RWCAR) of all banks, which is a major indicator of the health of the banking system, rose from 6.5% in June 2007 to 9.5% (the mandatory ratio is 10%) in June 2008. Significantly, the RWCAR of SCBs rose from -7.1% in December 2007 to 6.3% in June 2008. Other banks (private and foreign commercial) met the needed RWCAR of 10%. Profitability indicators for banks such as return on assets (ROA) and return on equity (ROE) ratios also improved between December 2007 and June 2008. The ROA and ROE of the four SCBs were set to zero as per Bangladesh Bank requirement because of provisioning shortfalls. The financial positions of the SCBs, which still account for over 30% of banking system assets, need to be strengthened for financial sector development and to reduce Government contingent liabilities.



35. Weighted average lending rates have fallen steadily since September 2007 (12.9%) and stood at 12.3% in June 2008, but weighted average deposit rates rose during the period as banks tried to lower the spread under Bangladesh Bank guidance and mobilize savings to meet rising credit demand. Real deposit rates remained negative because of the country's double-digit inflation. Although the spread reduced slightly from 5.9% in June 2007 to 5.3% in June 2008, it remains high, indicating banking inefficiencies that require attention (Figure 15).



36. Domestic banks are reasonably well regulated and managed, and are unlikely to be affected by the ongoing global financial crisis. The banks have a sound capital base and liquidity, and are not holding any toxic international assets. Bangladesh Bank is providing timely advice to commercial banks and nonbank financial institutions to provide more credit to activities that generate domestic value added and create jobs in the country, while carefully assessing creditworthiness of borrowers. Bangladesh Bank's continuous efforts to strengthen its regulatory and supervisory activities for banks and other financial institutions, improve its surveillance of the financial sector, and enhance the quality of financial data will contribute to containing the adverse effects of the global financial crisis on the financial sector. To maintain financial stability and absorb external shocks to the financial sector, greater balance in liquidity management must be maintained and greater attention paid to credit quality considering the high credit growth rates for the Government and the private sector.

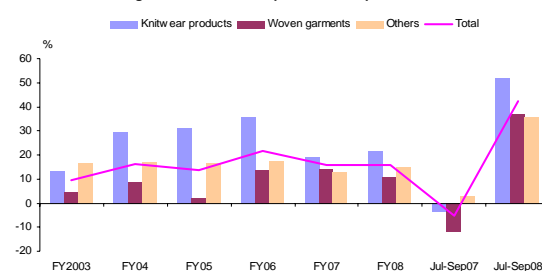
### Balance of Payments

37. FY2009 began well for the export sector with robust performance during July–September quarter as total exports grew by 42.4% (Figure 16). The growth in exports was broad-based, as all items grew at very high rates. For example, export of woven garments rose by 36.7% and knitwear by 52.0%. The volume index of export of primary commodities declined by 28.8%, while that for manufactured products rose by 37.3%; their price indexes rose by 40.7% and 7.7%, respectively. A major cause of the high growth is the comparatively weak performance of exports during July–September 2007. However, the rise in the volume index for manufactured products indicates higher production activities in the export sector in the first quarter of FY2009.

38. The Government fixed the country's merchandise export target at \$16.2 billion for FY2009, 15.5% higher than export receipts in FY2008. This growth target was set taking into account the previous year's growth trend, and views received from sector representatives, Bangladesh's foreign missions, and relevant government agencies.

39. International buyers of Bangladeshi products are encouraged by the recent reform initiatives and major improvement in ports, customs, and safety and labor standards in Bangladesh. But they stress the importance of upgrading infrastructure, as high energy and transport costs are among the major obstacles to trade. The Crisis

Figure 16. Growth in exports and components

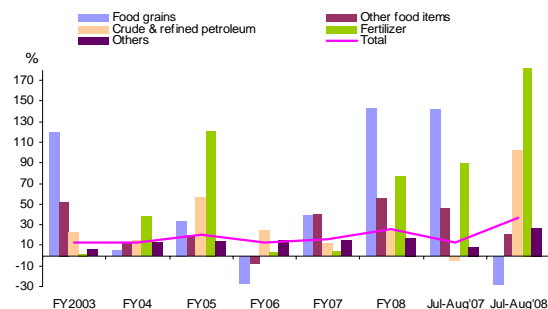


Management Cell of Bangladesh Garment Manufacturers and Exporters Association addresses labor and compliance issues. It reports that most factories have implemented the minimum wage, and health and safety mandates, including those for emergency evacuation and fire extinguishers. The engagement of child labor has been largely eliminated. Payments for overtime, weekly holidays, maternity, and annual leave have been regularized in most factories. Major buyers conducting random factory inspections expressed satisfaction with the recent developments on compliance with international standards.

40. Exports from Bangladesh are potentially vulnerable to the unfolding global financial crisis. Export earnings could slow because of a fall in demand due to recession in advanced countries or because of lower prices offered by competing countries. The vulnerability is caused by the lack of diversification both in terms of products and destinations, as almost 76% of Bangladesh's exports are concentrated on textiles and over 90% of the textiles are destined for the United States and European markets. However, while demand for textiles to these destinations may slow, it is unlikely to fall sharply in the short run. Bangladesh's exports mainly belong to the low end of the market, as the country exports basic readymade garments products, which could be categorized as necessities. Demand could rise selectively, as people who customarily buy higher-value items begin to shift to lower-value items. If the financial crisis is not deep, readymade garment export earnings might maintain healthy growth, with a fall in prices being offset by growth in volume. If however the crisis is prolonged, with major demand retrenchments because of widespread job losses, then Bangladesh's textile exports would not remain insulated. Exports that are income elastic, such as, frozen foods and leather products, are likely to be affected even at the early stages of the crisis. Bangladesh needs to diversify its export base and create new markets for its products to make the economy more resilient to global slowdowns.

41. Import payments during July–August of FY2009 rose by 36.9% over the same period of FY2008 (Figure 17). Among food items, rice, sugar, and edible oil maintained healthy growth. Within the consumer and intermediate goods category, crude and refined petroleum, chemicals, and fertilizer recorded high growth. Imports of plastic and rubber articles, yarn, and staple fiber grew rapidly, indicating a pickup in industrial activity. High growth was also observed for steel, iron, and other base metals. Total value of letters of credit opened during the first quarter of FY2009 rose by 24.3% over the

Figure 17. Growth in imports and its components



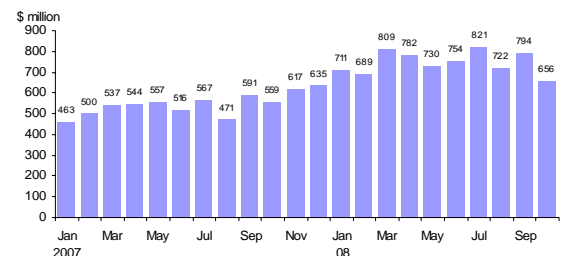
corresponding period of the previous year. Letters of credit for imports of food grains and other consumer goods declined by 49% and 19.1%, respectively, because of the improved domestic crop outlook and expected pickup in domestic manufacturing, while those for intermediate goods (47.4%), industrial raw materials (37.8%), and petroleum products (83.8%) rose sharply, although those for capital machinery fell (-2.8%).

42. Because of the fall in international oil and commodity prices, the import bill is expected to be manageable in FY2009. Import trade finance may however be affected, as liquidity shortages may create difficulties for international negotiating banks to support import activities. Declines in import values (tax-base at the import stage) because of the fall in commodity prices (if not offset by a rise in import volumes) would also imply losses of revenue, which could in turn affect essential public spending.

43. Bangladesh needs to accelerate trade liberalization and expedite trade facilitation measures to enhance external competitiveness. Despite trade liberalization during the past two decades, the country still maintains a restrictive trade policy and has one of the highest trade barriers in South Asia. According to the recently published *World Trade Indicators 2008*, a new database and ranking tool that allows benchmarking and comparisons of 210 countries and customs territories across multiple trade-related indicators, Bangladesh ranked 113th and 107th in terms of trade policy and institutional environment, respectively, out of 125 countries studied. Bangladesh was found to have very high tariff and nontariff barriers compared with most countries. Bangladesh's utilization of the Generalized System of Preferences for exports to Europe and the United States was about 69% in 2007, which is indicative of weak institutional capacity and slow supply response of the home country.

44. Remittance inflows continue to exhibit robust growth in the new fiscal year. Total remittance receipts during July–October 2008 rose by 36.8% over the same period of the preceding year (Figure 18). About 63% of the remittances sent by out-of-country workers were from the Middle East, and about 32% were from the United States and Europe. The large majority of these workers are unskilled and involved in low-end jobs, which are less likely to be seriously affected at the beginning of an economic slowdown. Although megaprojects requiring large investments will likely be deferred even in the Middle East where oil revenues could sustain spending, these countries are expected to continue other construction and

Figure 18. Workers' Remittances



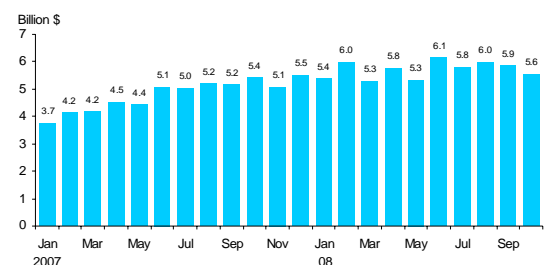
development activities in which Bangladeshi workers could remain engaged. Again, if the crisis is prolonged, sectors such as construction and retail and services sectors where Bangladeshi unskilled and semiskilled workers are employed will also become affected, which would reduce the flow of remittances.

45. Bangladesh has not been a major recipient of foreign direct investment (FDI) or foreign portfolio investment. Thus, the potential disruption of FDI inflows or the outflows of portfolio investment is not a major concern. However, expected FDI flows in the energy sector, which the country urgently needs, are unlikely to materialize in the near term as investors will be cautious about any large investments. Postponement of energy sector FDI will be seriously detrimental to growth prospects in view of the prevailing acute power and gas shortages.

46. Although foreign aid to developing countries is a potential casualty of any international financial crisis, the effects may not be evident for Bangladesh in the first couple of years of the ongoing crisis. Bangladesh relies mostly on multilateral financing, which is committed well in advance. Even the major bilateral donors are expected to maintain their committed assistance in the near to medium term. Although aid dependence for Bangladesh has declined sharply, the country still depends on foreign aid for implementing a major share of its public spending. Any sustained decline in aid inflows would jeopardize the country's development programs by affecting infrastructure investment and human resource development activities. However, Bangladesh's debt service ratio is low at 3.3% in FY2008 and foreign loans are mostly long term and concessional. Thus, Bangladesh's risk of debt distress is low.

47. The trade balance recorded a deficit of \$879 million during July-August 2008, the first two months of FY2009, up from the \$726 million deficit during July-August 2007. Despite a higher trade deficit, a sharp rise in current transfers, particularly workers' remittances, resulted in a surplus of \$320 million in the current account during July-August 2008 against a deficit of \$79 million during July-August 2007. The surplus in the overall balance declined to \$65 million during July-August 2008 from \$130 million during July-August 2007, because of a deficit in the financial account. Gross foreign exchange reserves of Bangladesh Bank were lower at \$5.6 billion (equivalent to about 3 months of imports) at the end of October 2008, against \$5.8 billion at the end of July 2008. However, this was higher than the \$5.4 billion at the end of October 2007

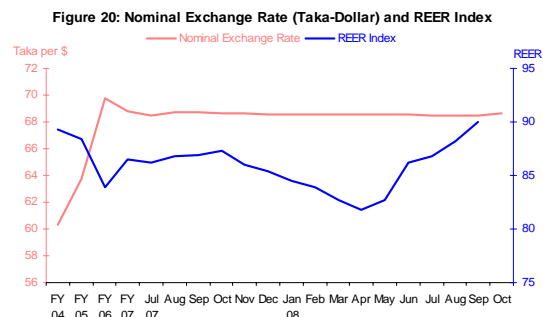
Figure 19. Gross Foreign Exchange Reserves



(Figure 19). Although export earnings and remittances could drop somewhat, this should be offset by falling prices of key commodities, such as food grains, edible oil, petroleum, and steel, which would moderate the import bill. Thus, the current account is expected to remain in surplus, which will contribute to maintaining a comfortable reserve position.

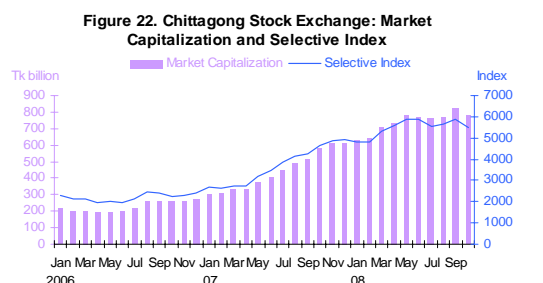
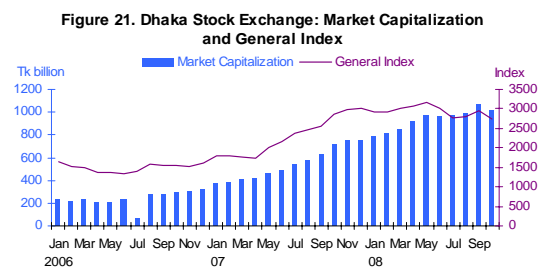
### Exchange Rate

48. The weighted average nominal exchange rate (taka/dollar) remained stable between Tk68.5–Tk68.6:\$1 during the first quarter of FY2009, indicating a healthy reserve position (Figure 20). Bangladesh Bank intervened periodically to maintain stability in the foreign exchange market. The exchange rate showed little volatility in the face of the global financial crisis. With currency convertibility limited to current account transactions, the risks of capital flight and consequent exchange rate instability are minimal.



### Capital Market

49. Stock market indicators rose in the first quarter of FY2009, after which they started declining. The Dhaka Stock Exchange (DSE) general index reached 2,966.8 points at the end of September 2008, a rise of 7.5% from July. The DSE general index then dropped by 7.4% in October (Figure 21). Although the share of foreign portfolio investment in the country’s stock market is small and the global financial crisis is not expected to have significant effects on the domestic stock market, the downward movements in share prices were likely caused by market speculation and selling pressures from nervous retail investors. DSE market capitalization reached Tk1,068 billion, increasing by 10.1% from July 2008 to September 2008; however, it declined to Tk1013 billion in October 2008. Similar trends were observed at the Chittagong Stock Exchange (CSE), the country’s other stock exchange. The CSE selective categories index rose to 5,892.7 in September 2008 from 5,517.5 in July 2008, a rise of 6.8%; while market capitalization rose by 7.5% during the same period. However, in October, the CSE selective categories index declined by 7.3% (Figure 22). Both the DSE and CSE indexes continued to fall and reached 2,584.02 and 5,164.21 points respectively on 9 November 2008, representing decline of 12.9% and 12.4% respectively from September 2008.



50. The recent private placement by Grameenphone, the largest mobile phone company in the country, of

coupon-bearing bonds is a major breakthrough in raising corporate financing from the capital market. To raise capital and reduce liquidity risks, the company signed agreements with 10 bank and nonbank financial institutions to raise Tk4.25 billion from the local capital market. This initiative will encourage other big investors to explore funding opportunities beyond conventional bank loans.

## CLIMATE CHANGE, A DEVELOPMENT CHALLENGE FOR BANGLADESH: MEASURES FOR ADAPTATION AND MITIGATION<sup>3</sup>

51. Climate change is a pressing development challenge for Bangladesh in view of the country's vulnerability to its impacts. The observed and projected impacts of climatic change and variability include a rise in sea level, higher temperatures, greater monsoonal rains and reduced dry season precipitation and runoff, a rise in the frequency and intensity of tropical cyclones and storm surges, and extreme weather events. These changes have already caused severe losses in terms of life and property damage, and seriously constrain Bangladesh's development prospects. As the poor live and depend disproportionately on marginal lands, including coastal belts, they are the most vulnerable and the prime victims of the detrimental effects of climate change. In association with other socioeconomic and environmental factors, climate change and variability may amplify existing environmental stress, contributing to lack of security to meet basic needs (e.g., food, shelter, water, and health) and conflict over natural resources. Climate change causes extensive damage to infrastructure, affecting the economy's productivity by eroding its productive capacity. It also reduces the security of livelihood assets for the poor and their access to such assets. Addressing climate change concerns has thus become urgent and a priority issue for continuing the country's development activities and sustaining gains in poverty reduction.

### Major Climate-Induced Disasters and their Impacts

52. **Floods.** Bangladesh has been inundated by major floods with increasing frequency (Table 1) over the past 55 years. Before the country can fully recover from one flood episode, it is exposed to another equally or more devastating flood. Global warming, by increasing runoff, enhances the risk of flooding. A recent study reported that a 2° Celsius (C) warming will result in a 10% rise in precipitation that would increase runoff in the Ganges, Brahmaputra, and Meghna rivers by 19%, 13%, and 11%, respectively.<sup>4</sup>

53. **Cyclones and Storm Surges.** The country has been subject to tropical cyclones and storm surges at regular intervals over the past century (Table 2). During 1900–2001, the rate of tropical cyclones hitting the Bangladesh coast was 10.6 per decade.<sup>5</sup> Since 1950, the rate of tropical cyclones and storm surges has risen significantly along with their frequency and intensity. In the past 125 years, more than 42 major cyclones hit the coast of the Bay of Bengal; 14 occurred over the past 25 years.<sup>6</sup> Most recently, in November 2007, the category-4 super cyclone SIDR<sup>7</sup> with peak winds at 250 kilometers/hour, hit Bangladesh and caused more than 4,000 deaths. A report<sup>8</sup> calculated the effects of a repeat of the 1991 cyclone with a 2°C rise in temperature (with a 10% rise in wind speed) and a 0.3 meter sea level rise. The report

<sup>3</sup> The article draws on the presentation Climate Change and Variability and Possible Adaptation Strategy and Action Plan for Bangladesh—A Country Perspective by Arif M. Faisal, ADB Bangladesh Resident Mission Consultant, at ADB South Asia Subregional Economic Cooperation (SASEC) 4th Environment Working Group Meeting, Bangkok, Thailand, 25–26 September 2008 and, other materials.

<sup>4</sup> Mirza, M. M. Q., and A. Dixit. 1997. Climate Change and Water Resources in the GBM Basins. *Water Nepal* 5: 71–100.

<sup>5</sup> Islam, T., and R. E. Peterson. (undated). *Tropical Cyclone Wind Characteristics for the Bangladesh Coast Using Monte Carlo Simulation*. available at <http://ams.confex.com/ams/pdfpapers/107887.pdf>, accessed on 16 Nov 2008.

<sup>6</sup> Government of Bangladesh, Ministry of Land. 2007. *Inception Report of the Coastal Land Use Zoning Project*. Dhaka.

<sup>7</sup> A devastating tropical cyclone hit the Bangladesh coast in November 2007.

<sup>8</sup> Ali, A. 1996. Vulnerability of Bangladesh to Climate Change and Sea Level Rise through Tropical Cyclones and Storm Surges. *Water, Air, and Soil Pollution* 92:171–179.

estimated that this could result in a 1.5 meter higher storm surge that would inundate 20% more land than the storm surge from the 1991 cyclone. In recent years, general cyclonic activity in the Bay of Bengal has become more intense and frequent, causing rougher seas.

**Table 1: Major Floods in Bangladesh in the Past 55 Years**

<b>Year of Flood</b>	<b>Impacts</b>
1954	Affected 55% of the country
1974	Moderately severe, more than 2,000 deaths, affected 58% of the country, followed by famine with more than 30,000 deaths
1984	Inundated 52,520 square kilometers, estimated damage \$378 million
1987	Inundated more than 50, 000 square kilometers, estimated damage \$1 billion, 2,055 deaths
1988	Inundated 61% of the country, estimated damage \$1.2 billion, more than 45 million homeless, between 2,000 and 6,500 deaths
1998	1,100 deaths, inundated nearly 100,000 square kilometers, rendered 30 million people homeless, damaged 500,000 homes, heavy loss to infrastructure, estimated damage \$2.8 billion
2004	Inundation 38%, damage \$6.6 billion, deaths 700, affected people nearly 3.8 million
2007	More than 47 districts seriously affected, nearly 90,000 houses destroyed and another 600,000 damaged, many hectares of crops destroyed and partially damaged

Source: Government of Bangladesh. 2005. *National Adaptation Programme of Action (NAPA)*. Dhaka; Government of Bangladesh. 2007. *Consolidated Damage and Loss Assessment: Lesson Learnt from the Flood 2007 and Future Action Plan*. Disaster Management Bureau (DMB), Dhaka.

**Table 2: Bangladesh Tropical Cyclone Data of the Past 50 Years**

<b>Date of Occurrence</b>	<b>Maximum wind speed (km/hr)</b>	<b>Height of tidal surge (m)</b>	<b>Deaths</b>
9 Oct 1960	162	3	3,000
30 Oct 1960	210	4.5-6	5,149
9 May 1961	146	2.4-3	11,466
28 May 1963	203	4.2-5.1	11,520
11 May 1965	162	3.6	19,279
14 Dec 1965	210	4.5-6	873
1 Oct 1966	146	4.5-9	850
12 Nov 1970	223	6-9	500,000
25 May 1985	154	3-4.5	11,069
29 Nov 1988	162	1.5-3	2,000
29 April 1991	225	6-7.5	140,000
29 Apr-3 May 1994	210	-	400
21-25 Nov 1995	210	-	650
19 May 1997	225	4.5	126
16-20 May 1998	150	4.5	-
19-22 Nov 1998	90	3.6	-
14 May 2007	-	-	-
15 Nov 2007 (SIDR)	250-280	-	3,199

hr = hour, km = kilometer, m = meter.

Source: Bangladesh Space Research and Remote Sensing Organization (SPARRSO), International Federation of Red Cross and Red Crescent Societies (IFRC), and Chowdhury, A.M. 1991.

54. **Drought.** With rising temperatures, the country is experiencing a higher occurrence of drought. Drought is a critical issue for the Barind Tract of the country, which generally has lower rainfall. Very severe droughts hit the country in 1951, 1961, 1975, 1979, 1981, 1982, 1984, 1989, 1994, and 1995. 2000, 2004, 2005 and 2007.<sup>9</sup> Between 1960 and 1991, droughts occurred during 19 years,<sup>10</sup> covering as much as 47% of the country's area and 53% of the current population.<sup>11</sup> Higher temperatures may subject larger areas to drought because of climate change. Drought has severely affected the climate-sensitive agriculture sector, affecting food production, water resources, and human health. Major investments over the last two decades in the Barind Tract were made to assist adaptation against drought and increase agricultural productivity. However, most of these efforts will be undermined by increasing drought in the northwestern part of the country.

### Geophysical Causes of Vulnerability

55. The harmful impacts of climate change are exacerbated by the country's vulnerable geophysical location, low deltaic floodplain, hydrological influence of erratic monsoon rainfall, and changes in regional water-flow patterns. Bangladesh is one of the largest deltas in the world, formed by the dense network of three of the largest rivers in the world—the Ganges, Brahmaputra, and Meghna. The topography of Bangladesh is mostly low floodplain with almost 80% of the total land area barely 9 meters above mean sea level. This floodplain is again criss-crossed by a large number of river networks, making it susceptible to river and rainwater flooding, and in low-lying coastal areas, to tidal flooding during storms. Of the 30 agroecological zones in Bangladesh, 13 are vulnerable to severe flood, drought, cyclone, or extreme weather events<sup>12</sup> (Table 3).

**Table 3: Major Hazards in Different Agroecological Zones of Bangladesh**

Agroecological Zone	Location (district)	Hazard		
		Flood	Drought	Cyclone
Old Himalayan Piedmont Plain	Panchagarh, Thakurgaon, and Dinajpur		Very severe, severe, and moderate	
Active Tista Floodplain	Nilphamari, Rangpur, Lalmonirhat, Kurigram, and Gaibandha	Severe		
Active Brahmaputra-Jamuna Floodplain	Kurigram, Gaibandha, Bogra, Sirajganj, Pabna, Sherpur, Jamalpur, Tangail, and Manikganj	Severe		
Active Ganges Floodplain	Nawabganj, Rajshahi, Lakshmipur, and Barisal	Severe		
High Ganges River Floodplain	Nawabganj, Rajshahi, Pabna, Kushtia, Meherpur, Jessore, Chuadanga, Jhenaidah, Magura,	Low	Severe and moderate	

<sup>9</sup> Water Resources Planning Organization. 2005. *National Adaptation Programme of Action: Water, Coastal Areas, Natural Disaster and Health Sector*. Dhaka.

<sup>10</sup> Mirza, M. Q., and S. Paul. 1992. *Natural Disaster and Environment in Bangladesh* (in Bengali), Centre for Environmental Studies and Research, Dhaka.

<sup>11</sup> Ahmed, A. U. 2006. *Bangladesh: Climate Change Impacts and Vulnerability: A Synthesis*. Climate Change Cell, Department of Environment, Bangladesh.

<sup>12</sup> Ahmed, Nasiruddin. 2008. *Facing the Challenge of Climate Change in Bangladesh*.

Agroecological Zone	Location (district)	Hazard		
		Flood	Drought	Cyclone
	Satkhira, and Khulna			
Ganges Tidal Floodplain (including Sundarbans)	Barisal, Jhalakati, Pirojpur, Patuakhali, Barguna, Bagerhat, Khulna, and Satkhira	Severe		High risk and risk
Young Meghna Estuarine Floodplain	Chittagong, Feni, Noakhali, Lakshmipur, Bhola, Barisal, Patuakhali and Barguna	Severe		High risk and risk
Northern and Eastern Piedmont Plain	Sherpur, Netrokona, Sunamganj, Sylhet, Moulvibazar, Habiganj, Brahmanbaria, and Comilla	Severe		
Chittagong Coastal Plain	Feni, Chittagong, and Cox's Bazar	Moderate		High risk
St. Martin's Coral Island	St. Martin's Island			High risk
High Barind Tract	Rajshahi, Nawabganj, and Naogaon		Very severe	
Level Barind Tract	Dinajpur, Gaibandha, Jaypurhat, Bogra, Naogaon, Sirajganj, and Natore		Very severe and severe	
Madhupur Tract	Dhaka, Gazipur, Narsingdi, Narayanganj, Tangail, Mymensingh, and Kishoreganj		Severe	

Source: Compiled by Nasiruddin Ahmed, 2008. *Facing the Challenge of Climate Change in Bangladesh*.

### Possible Future Episodes of Climate Change

56. Bangladesh is likely to experience a 1.0–1.04°C rise in temperature by 2030–2050. By 2100, the average rise of temperature could be 2.4°C. Any further rise in temperature will bring the deadliest consequences for the economy, environment, and human and social systems. Due to climate change, average sea levels are predicted to rise by about 30 centimeters by 2050, and could make an additional 14% of the country extremely vulnerable to floods, further squeezing settlements and resource use patterns with serious implications for livelihoods and the physical environment. Climate change will inundate vast areas of coastal Bangladesh—a 45 centimeter sea level rise along the coast may inundate 10%–15% of the land by 2050 and may dislocate more than 35 million people from the coastal districts.<sup>13</sup> With rising sea surface temperatures, the intensity and frequency of cyclones and storm surges are likely to increase. Higher salinity intrusion in coastal areas and riverbank erosion across the country will severely affect the lives and livelihoods of millions of poor and marginal people in the country. The melting of the Himalayan glaciers will cause floods by overflowing the inland rivers, and cause shortages of water for drinking and irrigation. The country may experience a 5%–6% rise in rainfall by 2030, which may create more frequent large and prolonged flooding. Episodes of drought in the northwestern region affecting agriculture, food production, water resources, and human health will become more frequent. Moderately drought-affected areas will be turned into severely drought-prone areas within the next 20–30 years.

<sup>13</sup> United Nations Development Programme. 2007. *Human Development Report 2007/2008. Fighting climate change: human solidarity in a divided world*. New York.

**Table 4: Future Climate Scenario for Bangladesh**

Year	Sea Level Rise (cm)	Temp Change (°C)			Rainfall Change (%)		
		Annual	DJF	JJA	Annual	DJF	JJA
2030	14	1.0	1.1	0.8	5	(2)	6
2050	32	1.4	1.6	1.1	6	(5)	8
2100	88	2.4	2.7	1.9	10	(10)	12

( ) = negative value, °C = Degree Celsius, cm= centimeter, DJF =December-January-February  
JJA =June-July-August.

Source: Agarwala et al. Intergovernmental Panel for Climate Change (IPCC) Third Assessment Report. Report cited by Government of Bangladesh. 2005. National Adaptation Programme of Action. Dhaka.

### Economic Effects of Climate Change

57. Climate change will affect different sectors of the economy to varying degrees. The transmission channels through which climate change could affect economic activity and human development are shown in Table 5 and the effects on the major economic sectors are discussed in the following paragraphs.

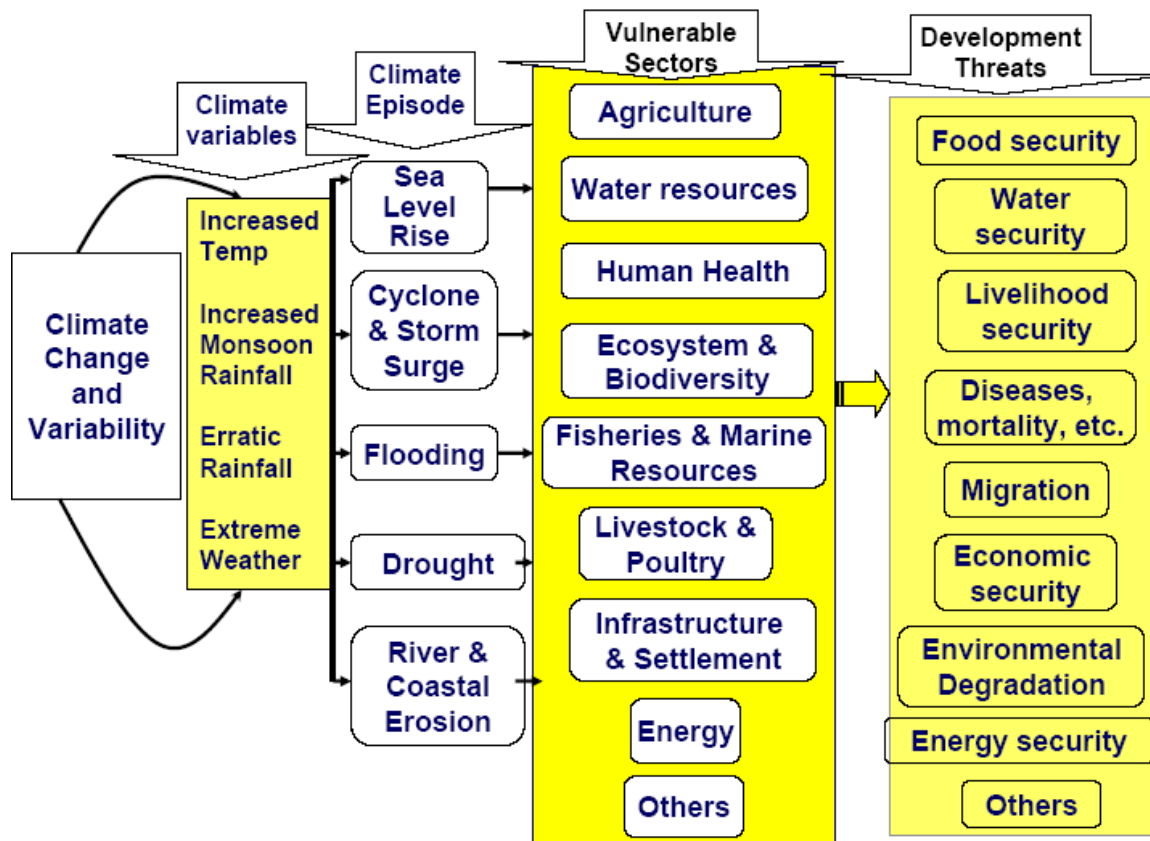
**Table 5: Intensity of Impacts on Different Sectors due to Climate Change**

Sectoral Vulnerability Context	Physical Vulnerability Context							
	Extreme Temperature	Sea Level rise		Drought	Flood		Cyclone and Storm Surge	Erosion and Accretion
		Coast Inundation	Salinity Intrusion		River	Flash		
Crop Agriculture	+++	++	+++	+++	+++	++	+++	-
Fisheries	++	+	+	++	++	+	+	-
Livestock	++	++	+++	+	+	+	+++	-
Water Resources	+	+++	-	-	++	+	+++	+++
Infrastructure	++	+++	++	-	++	+	++	-
Industries	++	+++	++	-	++	+	++	-
Biodiversity	+++	+++	+++	+	++	+	+	-
Health	+++	+	+++	++	++	-	++	-
Human Settlement	-	-	-	-	+	+	+++	+++
Energy	++	+	-	+	+	-	+	-

Note: +++ = high effects; ++ = medium effects, + = low effects, and – = no effects.

Source: Government of Bangladesh. 2005. *National Adaptation Programme of Action*. Dhaka.

Figure 23: Climate Change and Human Development



Linkage between climate change and development in Bangladesh

58. **Agricultural Production and Food Security.** The higher temperatures and changing rainfall patterns, along with higher flooding and rising salinity in the coastal belt and droughts in the northwest, are likely to reduce crop production. The International Panel for Climate Change estimates that by 2050, rice production in Bangladesh could decline by 8% and wheat by 32% against a base year of 1990.<sup>14</sup> The production of wheat, and high-yielding varieties of aus and boro might no longer be economically suitable under climate change. In southeastern Bangladesh alone, an estimated 14,000 tons of grain production could be lost annually to sea level rise by 2030 and 252,000 tons by 2075.<sup>15</sup> Because of the effects of climate change, use of inputs like fertilizers, pesticide, and irrigation may increase substantially, resulting in higher production costs. Climate change may lead to change of phenology, e.g., advance or delay of flowering, fruiting, and early arrival of insect pests, which ultimately affects production and yields. The reduced crop production will adversely affect food security and human well-being.

<sup>14</sup> Government of Bangladesh. 2008. Bangladesh Climate Change Strategy and Action Plan, Available at [www.moef.gov.bd/moef.pdf](http://www.moef.gov.bd/moef.pdf).

<sup>15</sup> Islam, S.M.R., S. Huq, and A. Ali. Undated. Beach erosion in the eastern coast line of Bangladesh. In *Bangladesh Climate Change Country Study: Assessment of Vulnerability and Adaptation to Climate Change*. Bangladesh Centre for Advanced Studies and Department of Environment, Dhaka.

59. **Water Security.** Climate change that results in floods, water logging, and higher salinity will pose major threats to water security. Problems relating to availability of fresh water for drinking and sanitation will become acute. Higher atmospheric water vapor, rising evaporation, and changes in soil moisture and runoff will ultimately reduce fresh water availability in arid and semi-arid regions. More intense rains and more frequent flash floods during the monsoon season will result in a higher proportion of runoff and a reduction in the proportion of water for groundwater recharge.

60. **Ecosystem and Biodiversity.** Higher salinity in the coastal belts could alter the entire ecosystem of the Sundarbans and affect the rich biodiversity of the forest. A 25-centimeter rise in sea level is predicted to result in a 40% mangrove loss,<sup>16</sup> and a 45-centimeter rise, combined with other forms of anthropogenic stress on the Sundarbans, could lead to the destruction of 75% of the Sundarbans mangroves.<sup>17</sup> Higher rainfall during the monsoon will cause increased runoff in the forest floor instead of infiltration into the soil resulting in enhanced soil erosion. Prolonged floods would severely affect growth of many timber species, causing high incidence of mortality for the *Artocarpus* species. Enhanced evapotranspiration in winter will cause greater moisture stress, especially in the Barind and Madhupur tract areas, affecting the Sal forest ecosystem. As a consequence of these episodes, growth of the freshwater loving species (e.g., *Heritiera fomes*) will be severely affected and may be replaced by more saline-tolerant species (e.g., *Ceriops decandra*). The ecosystem may then be dominated by nonwoody shrubs and bushes with declining forest productivity and ecosystem integrity. Degradation of forest quality might cause a gradual depletion of rich diversity of the forest flora and fauna of the Sundarbans ecosystem.<sup>18</sup> If the Sundarbans are lost, the habitat for several valuable species including Bengal tiger, Barking deer, and Sundri tree (*Heritiera fomes*) will be seriously threatened and may be endangered.

61. **Human Health.** Climate change is likely to worsen human health because of reduced food and water security, and increased water-borne disease caused by poorer water quality. Recent studies by the International Center for Diarrheal Disease Research Bangladesh demonstrate that diarrheal diseases are on the rise, which the center attributes partly to greater flooding and drainage congestion. Climate change will increase the burden of various vector-borne air and water-related infectious diseases. High summer temperatures could increase deaths due to heat stress. Global warming could also produce more rapid replication of malaria and dengue. Diseases like avian flu, nipah virus<sup>19</sup> infections, and unknown encephalitic diseases may become common. Heat stress and cold wave-related health problems could be on the rise and adverse impacts on human reproductive systems may be experienced.

62. **Fisheries and Livestock.** Climate change could lead to loss of fishing grounds and coastal inland fisheries, and changes in species composition. There will also be major loss of freshwater culture fisheries and adverse impacts on coastal shrimp culture. Climate change will disrupt river (estuary)-canal-floodplain fish production systems and cause changes in migratory

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<sup>16</sup> Smith, J. B., A. Rahman, and M. Q. Mirza. 1998. *Considering Adaptation to Climate Change in the Sustainable Development of Bangladesh*. Report to The World Bank by Stratus Consulting Inc., Boulder, CO.

<sup>17</sup> UNESCO. 2007. *Case Studies on Climate Change and World Heritage*. Available at [http://whc.unesco.org/documents/publi\\_climatechange.pdf](http://whc.unesco.org/documents/publi_climatechange.pdf).

<sup>18</sup> Ahmed, A. U., N. A. Siddiqi, R. A. Choudhuri. 1999. Vulnerability of Forest Ecosystems of Bangladesh to Climate Change. In Huq, S., Z. Karim, M. Asaduzzaman, F. Mahtab (eds). *Vulnerability and Adaptation to Climate Change for Bangladesh*. Netherlands: Kluwer Academic Publishers.

<sup>19</sup> Nipah virus is a newly recognized zoonotic virus. The virus was 'discovered' in 1999. It has caused disease in animals and in humans, through contact with infectious animals. The virus is named after the location in Malaysia, where it was first detected.

routes for some species. Because of stormy weather, cyclones, and tidal surge, fishing time will shrink causing loss of livelihood of fisherfolk and disrupting fish trading. Like human beings, livestock and poultry may suffer due to natural disasters, higher temperatures, and floods. In changing climate scenarios, fodder production may decrease and disease and mortality rates may rise, which may threaten the viability of the livestock subsector.

63. **Migration.** Climate-induced natural disasters, riverbank erosion, and livelihood losses could accelerate rural to urban migration. Historically, disaster-induced rural–urban migration in search of improved livelihoods has created pressures on urban areas.<sup>20</sup> Sea level rise of 0.5 meters over the last 100 years has already eroded 65% of the land mass of Bhola, Kutubdia, and Sandwip islands.<sup>21</sup> Many people are also being displaced from other coastal islands, chars, and along the coastline as their settlements are destroyed by frequent and intense storm surges and tidal bores. “Climate refugees” comprise a major concern for the country. They are growing in number and must seek refuge because of loss of their homes, land, and settlements to riverbank erosion, coastal erosion, permanent inundation, and sea level rise.

64. **Livelihoods of the Poor.** Climate change is likely to directly impact poor people’s livelihoods, including employment, access to water and natural resources, homes, and infrastructure. Poor people often live in places and have livelihoods that are susceptible to natural calamities or adverse economic factors, and this limits their ability to cope with and recover from shocks and hazards. Climate change threatens food security of the poor by affecting the agriculture sector severely, where they are mostly engaged. Women appear to be the most vulnerable in this regard.

### **Options for Tackling Climate Change and Variability**

65. **Tackling Climate Change and Variability.** The key challenges in tackling climate change in Bangladesh are to ensure food and water security, protect infrastructure, and manage the disaster risk. Addressing health and energy insecurity, forced migration, and overall environmental degradation are additional challenges. These are further aggravated by high population pressures, lack of funds for appropriate adaptation, inadequate policy frameworks, and limited human and financial resources. Climate change may threaten the significant achievements Bangladesh has made in the last 20 years in raising incomes and reducing poverty. It also poses major threats to the achievement of the Millennium Development Goals, especially those related to eliminating poverty and hunger; ensuring food and health security, and human rights; and promoting environmental sustainability. Efforts to reduce poverty will only be sustainable over the longer term if they incorporate climate change adaptation and mitigation in development planning.

66. **Adaptation in Agriculture.** As the incidence of floods and drought is likely to rise, efforts should be made to develop climate-resilient crop varieties and cultivars. Agronomic manipulations such as shifting planting dates and using short duration crop cultivars could be the other options. In the dry months of March and April, when salinity problems resulting from seawater intrusion are more acute and lands are commonly left fallow as crop production is restricted by the presence of salts, cash crops such as tomatoes and chili can be grown with proper management of soil, water, and salinity. Use of raised beds and irrigation through drip

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<sup>20</sup> Asian Development Bank. 2006. *Urbanization and Sustainability in Asia.*, Manila.

<sup>21</sup> Government of Bangladesh. 2007. *Climate Change and Bangladesh.* Climate Change Cell, Department of Environment, Bangladesh.

irrigation systems may also be needed. In the coastal tidal floodplains during the *kharif* season when normally nothing can be grown due to high standing water, maize could be grown under the wet-bed no tillage method. In the tidal-flooded ecosystem, the so-called “*sorjan*” system of cropping, growing vegetables in raised beds could be an adaptation option. Early warning systems should be strengthened to inform farmers of adverse weather conditions. For water-logged areas, improving drainage, cultivating adaptive crops, developing technology for floating-bed agriculture and rice plus fish culture are some options. Integrated wetland farming, improved fish farming, mangrove and inland plantations, and agroecosystem-based crop production technologies are additional options.

67. **Adaptation for Water Security.** The need to modernize existing irrigation schemes and water demand management systems will be higher than under normal circumstances, aimed at optimizing physical and economic efficiency in the use of water resources. Public investment policies need to be adopted for improving access to available water resources, encouraging integrated water management, and promoting better practices for the sensible use of water in agriculture. Policies need to be adopted for protecting groundwater resources and water catchment areas. Activities such as rainwater harvesting, and creation of water reservoirs and surface water storage need to be encouraged. Coastal communities need to be provided with drinking water for combating enhanced salinity due to sea level rise. Integrated water management systems could be introduced. Water policy needs to be reformed with introduction of pricing to cover costs, and support more efficient irrigation. Improved water management and major rehabilitation of the coastal embankment are priority needs.

68. **Adaptation for Ecosystem and Biodiversity.** Afforestation and reforestation programs that are in line with climate, community, and biodiversity standards need to be adopted and encouraged. Sustainable and alternative livelihoods for ecosystem-, forest-, or biodiversity-dependent human communities need to be developed. Long-term monitoring of ecosystems with climate change-integrated conservation strategies is essential to adapt to climate change. Management techniques for forest tree species suitable for vulnerable and climate sensitive agroecological zones and different forest types need to be employed and tolerant varieties of forest crops and tree improvement practices need to be identified. In addition, creation and restoration of buffer zones and habitat mosaics around conservation areas, and development of methodologies for the intensive management of native species are the other options for adaptation. Coastal greenbelt projects may need to be revived to diffuse the forces of cyclones and storm surges.

69. **Adaptation in Health.** Improved housing and living conditions can reduce exposure to disease under adverse climatic conditions. Better irrigation water management is needed to reduce potential mosquito breeding sites. Community-based integrated vector management using the farmer field school experience gained in the agriculture sector in integrated pest management could help control the spread of disease. Public health systems need to be improved to cope with threats posed by climate change. Education, training, and awareness campaigns on public health need to be stepped up, and climate-sensitive disease surveillance programs initiated.

70. **Adaptation in Fisheries and Livestock.** Salt-tolerant fish species need to be developed for aquaculture in water-logged areas and ponds. Mechanized fishing technologies need to be introduced. Other possible adaptation options include protection against pond floating, mechanization of boats and fishing technology, development of pond aquaculture, provision of alternative livelihood for vulnerable fisherfolk, and introduction of climate-resilient fodder crops and climate-resilient poultry and livestock breeds.

71. **Mitigation Measures.** Mitigation efforts need to be undertaken to increase energy efficiency, expand renewable energy, and adopt suitable policy and institutional reforms for energy and power. Energy-efficient technologies in industry and trade need to be encouraged and more fuel-efficient vehicles and transport systems introduced. In agriculture, emission-reduction techniques need to be introduced through efficient rice cultivation. In forestry, support to existing and new homesteads and social forestry programs, and enhanced carbon sequestration need to be promoted through clean development mechanisms. In the urban sector, appropriate mitigation measures are needed for methane recovery from solid waste disposal, waste incineration and composting of organic waste, and recycling and waste minimization.

72. **Policy Responses and Support from Development Partners.** Considering climate change as a global challenge and development threat, the Government launched the National Adaptation Program of Action in 2005, which identified 15 priority activities, including general awareness raising, technical capacity building, and implementation of projects in vulnerable regions with special focus on agriculture and water resources. More recently, the Government set out the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) with six thematic areas: (i) food security, social protection, and health; (ii) comprehensive disaster management; (iii) infrastructure development; (iv) research and knowledge management; (v) mitigation and low-carbon development; and (vi) capacity building and institutional strengthening. The Government also established the National Climate Change Fund and allocated about \$45 million in the FY2009 budget to focus on adaptation. In the recently approved Second National Strategy for Accelerated Poverty Reduction, the Government reaffirms its commitment to the Millennium Development Goal targets through a strategy of pro-poor growth and climate-resilient economic development.

73. A Multi-Donor Trust Fund (MDTF) is being set up for the country to pool funds from development partners to implement a long-term strategy to mitigate the adverse effects of climate change. The Government of the United Kingdom launched a £75 million (\$130 million) grant-funded program to support the creation of the MDTF to be administrated by the World Bank. The BCCSAP is a 10-year program to build capacity and resilience within the country to meet the challenges of climate change over the next 20–25 years. About \$500 million is estimated to be needed in the next few years time to support programs for immediate actions such as strengthening disaster management capacity, research and knowledge management, capacity building and public awareness programs, and urgent investment in coastal embankments and cyclone shelters. The total cost of programs envisaged rises further to about \$5 billion after 5 years.

## About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries substantially reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two thirds of the world's poor. Nearly 1.7 billion people in the region live on \$2 or less a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance. In 2007, it approved \$10.1 billion of loans, \$673 million of grant projects, and technical assistance amounting to \$243 million.