

**POLICY AGENDA FOR ADDRESSING CLIMATE CHANGE IN BANGLADESH:  
COPENHAGEN AND BEYOND**

*Occasional Paper: 88*

*Fahmida Khatun, PhD  
AKM Nazrul Islam, PhD*

Publisher

---

**Centre for Policy Dialogue (CPD)**

House No 40/C, Road No 11 (new), Dhanmondi R/A

Dhaka-1209, Bangladesh

Tel: (880 2) 8124770, 9141703, 9141734

Fax: (880 2) 8130951

E-mail: [info@cpd.org.bd](mailto:info@cpd.org.bd)

Website: [www.cpd.org.bd](http://www.cpd.org.bd)

First Published March 2010

© Centre for Policy Dialogue

*Disclaimer:* The views expressed in this paper are those of the authors alone and do not necessarily reflect the views of CPD.

Tk. 60

ISSN 1818-1570 (Print), ISSN 1818-1597 (Online)

---

---

The Centre for Policy Dialogue (CPD), established in 1993, is a civil society initiative to promote an ongoing dialogue between the principal partners in the decision making and implementing process. The dialogues are designed to address important policy issues and to seek constructive solutions to these problems. The Centre has already organised a series of such dialogues at local, regional and national levels. The CPD has also organised a number of South Asian bilateral and regional dialogues as well as some international dialogues. These dialogues have brought together ministers, opposition frontbenchers, MPs, business leaders, NGOs, donors, professionals and other functional group in civil society within a non-confrontational environment to promote focused discussions. The CPD seeks to create a national policy consciousness where members of civil society will be made aware of critical policy issues affecting their lives and will come together in support of particular policy agendas which they feel are conducive to the well-being of the country.

In support of the dialogue process the Centre is engaged in research programmes which are both serviced by and are intended to serve as inputs for particular dialogues organised by the Centre throughout the year. Some of the major research programmes of the CPD include *Macroeconomic Performance Analysis, Agriculture and Rural Development, Eradication of Poverty, Trade, Regional Cooperation and Global Integration, Investment Promotion, Infrastructure and Enterprise Development, Climate Change and Environment, Human Development and Social Protection, and Development Governance, Policies and Institutions*. The CPD also conducts periodic public perception surveys on policy issues and issues of developmental concerns. With a view to promote vision and policy awareness amongst the young people of the country, CPD is also implementing a *Youth Leadership Programme*.

Dissemination of information and knowledge on critical developmental issues continues to remain an important component of CPD's activities. Pursuant to this CPD maintains an active publication programme, both in Bangla and in English. As part of its dissemination programme, CPD has been bringing out **CPD Occasional Paper Series** on a regular basis. Dialogue background papers, investigative reports and results of perception surveys which relate to issues of high public interest are published under this series. The Occasional Paper Series also include draft research papers and reports, which may be subsequently published by the CPD.

The present paper titled **Policy Agenda for Addressing Climate Change in Bangladesh: Copenhagen and Beyond** was prepared as the background paper for the CPD Dialogue on **United Nations Climate Change Conference 2009 in Copenhagen: Issues and Concerns for Bangladesh** on 18 November 2009, at BRAC Centre Inn, Dhaka.

This paper has been prepared by *Fahmida Khatun, PhD*, Additional Director, CPD and *AKM Nazrul Islam, PhD*, Senior Research Associate, CPD.

**Assistant Editor:** *Anisatul Fatema Yousuf*, Director, Dialogue & Communication, CPD.

**Series Editor:** *Mustafizur Rahman*, Executive Director, CPD.



# Contents

---

<i>Acronyms</i> .....	vii
1. INTRODUCTION.....	1
2. CLIMATE CHANGE: EVIDENCE AT THE GLOBAL LEVEL .....	5
3. CLIMATE CHANGE AND BANGLADESH.....	8
4. TOWARDS COPENHAGEN: MAJOR MILESTONES .....	13
5. ISSUES FOR BANGLADESH.....	17
6. CONCLUDING REMARKS .....	26
REFERENCES .....	27

# List of Tables, Figures and Boxes

---

## List of Tables

1. Impacts of Climate Change on the Millennium Development Goals.....	2
2. Estimates of the Costs of Global Climate Change in Terms of Future GDP Levels.....	8
3. Projected Changes in Climatic Conditions of Bangladesh.....	9
4. Projected Changes in Sea Level Rise and Level of Sediment of Bangladesh.....	9

## List of Figures

1. Global Average Temperature and Projections.....	6
2. Trends in Natural Disasters .....	7
3. Potential Impact of Sea Level Rise on Bangladesh .....	10
4. Estimates of Existing Resources and Financing Instruments Dedicated to Climate Change	20
5. Climate Financing Mismatch between Needs and Availability .....	21
6. Comparison of Financial Sector Bailouts by Developed Countries and Estimated Climate Financing Needs.....	22

## List of Boxes

1. Some Facts on Climate Change .....	5
2. Impacts of Climate Change on Bangladesh .....	11
3. Impacts of Climate Change on Bangladesh Agriculture .....	12

# Acronyms

---

ADB	Asian Development Bank
A4T	Aid for Trade
BBS	Bangladesh Bureau of Statistics
BCAS	Bangladesh Centre for Advanced Studies
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BUP	Bangladesh Unnayan Parishad
CDM	Clean Development Mechanism
CEARS	Centre for Environmental and Resource Studies
COP	Copenhagen Conference of Parties
CRU	Climate Research Unit
CSO	Civil Society Organisation
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
EGTT	Expert Group on Technology Transfer
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Relief and Recovery
GHG	Greenhouse Gas
GoB	Government of Bangladesh
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Right
LDC	Least Developed Country
MDG	Millennium Development Goal
NAMA	Nationally Appropriate Mitigation Action
NAPA	National Adaptation Programme of Action
NGO	Non-government Organisation
NTB	Non-tariff Barrier
OECD	Organisation for Economic Co-operation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SLR	Sea Level Rise
SPS	Sanitary and Phytosanitary
TBT	Technical Barriers to Trade
TRIPS	Trade Related aspects of Intellectual Property Rights
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USD	United States Dollar
WCC	World Climate Conference
WTO	World Trade Organization





## 1. INTRODUCTION

Climate change is one of the greatest environmental, social and economic threats that the planet faces at the moment. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) has projected that under a business as usual scenario, greenhouse gas (GHG) emissions could rise by 25-90 per cent by 2030 relative to 2000 and the earth could warm by 3°C in this century. The IPCC also predicts that even if the temperature rises by 1-2.5°C there could be serious effects on the lives and livelihoods of mankind, including reduced crop yields in tropical areas leading to increased risk of hunger, spread of climate-sensitive diseases such as malaria, and an increased risk of extinction of 20-30 per cent of all plant and animal species (IPCC 2007). Billions of people are feared to face shortage of water and food, and more risks to health and life due to climate change.

The severity and extent of the impact of climate change could be lessened through investments in the areas of adaptation and mitigation. Since least developed countries (LDCs) and developing countries are not significant emitters of GHGs they have lesser responsibility for its mitigation compared to the developed and industrialist countries. However, these countries will require substantial amount of resources to enable themselves for adaptation to climate change. The resource constraints as well as less emitting economic activities, livelihood patterns and life styles in these countries legitimise the demand for adequate compensation by the developed countries in terms of financial support, technology transfer and capacity building in order to cope with the risks of climate change.

Notwithstanding the divergence among countries on the emission reduction commitment the need for international support to poor nations for adaptation to climate change is somewhat recognized at a broader level. However, the pledged amount by the Annex I Parties<sup>1</sup> is far too less than the requirements of the LDCs and developing countries. The Stern Review (2007) concluded that the costs of strong and urgent action on climate change will be less than the costs thereby avoiding the impact of climate change under business as unusual. It proposes that one per cent of global gross domestic product (GDP) per annum is required to be invested in order to avoid the worst effects of climate change, and that failure to do so could risk global GDP being upto 20 per cent lower than it otherwise might be. The need for climate change adaptation and thus for financial requirement have strong economic justification. While the world is set to embark on a climate deal at the Copenhagen Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC) in December 2009, the issue of financing the adaptation and mitigation of climate change should be high on the agenda of poor and vulnerable countries.

Though the impact of climate change will be felt differently by different countries, poor nations, such as Bangladesh will be the worst-hit. The increase in global average air and oceanic temperatures is likely to change the patterns of rain and snowfall, droughts and heat waves, intensity of tropical cyclones and floods, and global mean sea level. The most severe impact of global warming is expected to be felt in the rising sea level of the Bay of Bengal, which is anticipated to submerge 20 per cent of the total land of Bangladesh. The

---

<sup>1</sup>Annex I Parties include the industrialised countries that were members of the Organisation for Economic Co-operation (OECD) in 1992, plus countries with economies in transition, including the Russian Federation, the Baltic States, and several Central and Eastern European States.

effects of sea level rise (SLR) will be manifested in various ways such as increased rates of coastal erosion, loss of coastal vegetation and habitats, intrusion of salt into groundwater system and coastal ecosystems, temporary and permanent flooding, and storm surges. These effects will in turn have negative consequences on agriculture, water resources, commercial and residential property values, energy and transportation systems, and human health and safety.

The predicted outcome of climate change will have major impact on the LDCs. Bangladesh has already been experiencing climatic variability and extreme weather events. Droughts, floods and other natural disasters are seriously disrupting the economic growth and poverty reduction processes in the country. Two floods and a cyclone (*Sidr* in 2007), are the recent evidences of climate change as a result of which there was a fall in agricultural production and reduction in GDP growth. This led to food shortage and price hike, leaving the poor suffer.

Climate change will have negative impacts on both rural and urban areas. Various types of impacts can be categorised due to climate change, variability of weather and SLR. *First*, agricultural productivity may decline; security of poor people's livelihood assets may reduce; and access to livelihood assets by the poor may fall due to increased incidences or intensity of climate-related disasters. This will lead to damage of natural and economic infrastructure. Water stress will increase due to changes in precipitation, variability in monsoon and reduction in glaciers-fed river flows. *Second*, changes in temperature, water and vegetation as a result of climate changes may contribute to increased prevalence of diseases. This would in effect increase the vulnerability of the poor as they would have fewer effective strategies to mitigate the negative consequences of climate change, especially on their income and employment. *Third*, there will also be qualitative changes in the lives of poor as health and education may be disrupted. *Fourth*, increased temperature and changes in precipitation may reduce agricultural and natural resources, which will in turn reduce industrial output and labour productivity leading to increased income inequality and disruption on trade and other economic activities. This implies that there may be pressure on the fiscal balance which can also have negative impact on economic growth and poverty reduction process in the developing countries. All these impacts will have a spill over effect on the poverty level of the country. From this point of view, climate change will pose threats to food and energy security in Bangladesh. Thus climate change and poverty are two entwined challenges to be addressed simultaneously in Bangladesh. The impact of climate change on agriculture, disease patterns and violent weather attacks will only worsen the poverty situation of Bangladesh. That is how climate change also poses a significant threat to the achievement of the Millennium Development Goal (MDG) of the United Nations (UN) which sets environmental sustainability (Goal 7) as one of the eight MDGs to achieve global economic and social well-being. As a matter of fact, climate change can have impact on the achievements of all MDGs as has been shown in Table1.

**Table 1: Impacts of Climate Change on the Millennium Development Goals**

<b>Millennium Development Goal</b>	<b>Potential Impacts of Climate Change</b>
Goal 1: Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> <li>– Damage to livelihood assets, including homes, water supply, health, and infrastructure, can undermine people’s ability to earn a living;</li> <li>– Reduction of crop yields affects food security;</li> <li>– Changes in natural systems and resources, infrastructure and labour productivity may reduce income opportunities and affect economic growth;</li> <li>– Social tensions over resource use can lead to conflict, destabilising lives and livelihoods and forcing communities to migrate.</li> </ul>
Goal 2: Achieve universal primary education	<ul style="list-style-type: none"> <li>– Loss of livelihood assets and natural disasters reduce opportunities for full-time education, more children (especially girls) are likely to be taken out of school to help fetch water, earn an income or care for ill family members;</li> <li>– Malnourishment and illness reduces school attendance and the ability of children to learn when they are in class;</li> <li>– Displacement and migration can reduce access to education.</li> </ul>
Goal 3: Promote gender equality and empower women	<ul style="list-style-type: none"> <li>– Exacerbation of gender inequality as women depend more on the natural environment for their livelihoods, including agricultural production. This may lead to increasingly poor health and less time to engage in decision making and earning additional income;</li> <li>– Women and girls are typically the ones to care for the home and fetch water, fodder, firewood, and often food. During times of climate stress, they must cope with fewer resources and a greater workload;</li> <li>– Female-headed households with few assets are particularly affected by climate-related disasters.</li> </ul>
Goal 4: Reduce child mortality	<ul style="list-style-type: none"> <li>– Deaths and illness due to heat-waves, floods, droughts and hurricanes;</li> <li>– Children and pregnant women are particularly susceptible to vector-borne diseases (e.g. malaria and dengue fever) and water-borne diseases (e.g. cholera and dysentery) which may increase and/or spread to new areas; e.g. anaemia resulting from malaria is currently responsible for one-quarter of maternal mortality.</li> </ul>
Goal 5: Improve maternal health	<ul style="list-style-type: none"> <li>– Reduction in the quality and quantity of drinking water exacerbates malnutrition especially among children;</li> <li>– Natural disasters affect food security leading to increased malnutrition and famine, particularly in Sub-Saharan Africa.</li> </ul>
Goal 6: Combat HIV/AIDS, malaria and other diseases	<ul style="list-style-type: none"> <li>– Water stress and warmer conditions encourage disease;</li> <li>– Households affected by AIDS have lower livelihood assets, and malnutrition accelerates the negative effects of the disease.</li> </ul>
Goal 7: Ensure environmental sustainability	<ul style="list-style-type: none"> <li>– Alterations and possible irreversible damage in the quality and productivity of ecosystems and natural resources;</li> <li>– Decrease in biodiversity and worsening of existing environmental degradation;</li> <li>– Alterations in ecosystem-human interfaces and interactions lead to loss of biodiversity and loss of basic support systems for the livelihood of many people, particularly in Africa.</li> </ul>
Goal 8: Develop a global partnership for development	<ul style="list-style-type: none"> <li>– Climate change is a global issue and a global challenge; responses require global cooperation, especially to help developing countries adapt to the adverse effects of climate change;</li> <li>– International relations may be strained by climate impacts.</li> </ul>

Source: UNFCCC (2007).

While MDGs are halfway through towards their achievement targets by 2015, Bangladesh is yet to make any discernible improvements in case of environmental sustainability which is threatened by the negative impacts of climate change.

Realising the clear and present danger posed by climate change and the need to address it, the Bali Roadmap was adopted at the COP-13 Meeting to the UNFCCC in December 2007 in Bali Island of Indonesia. The Roadmap launched a process of negotiations on cooperative action on climate change upto and beyond 2012, the final year of the commitment period (2008-2012) for reducing GHG under the Kyoto Protocol.<sup>2</sup> The negotiations are planned to be completed by the COP-15 to be held in Copenhagen, Denmark during 7-18 December 2009. In view of the upcoming Climate Change Conference in Copenhagen, Bangladesh has to prepare her strategies in terms of building its arguments in favour of a number of issues which are critical towards combating the negative impacts of climate change and gaining a fair share of the global climate deal.

Not only issues of finance and technology transfer are important for Bangladesh, it has to have a clear position on various aspects of the climate change negotiations, the relationship between trade and climate change, and the ways trade can be used to fight climate change. In parallel with international negotiations, initiatives at the domestic level are needed for improving the use of financial resources and quality of technology transfer which pre-supposes the need for capacity building, creation of an enabling environment, inclusion of all stakeholders, establishment of effective mechanisms through improved transparency of project approval and public procurement procedures, and removal of corruption.

In view of its vulnerability to climate change and resultant impacts on various sectors of the economy the present paper flags some important issues and priorities to be brought forward during the Copenhagen Conference and beyond. Following the introductory section, some of the evidences and scientific findings as regards climate change are presented in brief in *Section 2*. The climatic change in Bangladesh and the impacts of such change are discussed in *Section 3*. Based on various reports this section outlines the signs of climate change and how such changes are having impacts on various sectors in the country, including the economy, the society, human health and the ecology. *Section 4* discusses the context of the Copenhagen Conference focusing on major milestones towards Copenhagen. It also highlights some of the major debates among countries surrounding the Conference. *Section 5* discusses the issues and priorities for Bangladesh which need to be underscored in the Copenhagen Climate Conference. These issues should be focused not only in the upcoming Climate Conference, but also in all international negotiations beyond Copenhagen. Finally, the paper concludes with some remarks on the implementation of programmes on adaptation to climate change in *Section 6*.

---

<sup>2</sup>The Kyoto Protocol is an international agreement linked to the UNFCCC. Its major feature is to set binding targets for 37 industrialised countries and the European community for reducing GHG emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. The Protocol was adopted in Kyoto, Japan, on 11 December 1997, and entered into force on 16 February 2005. 184 Parties of the Convention have ratified its Protocol to date.

## 2. CLIMATE CHANGE: EVIDENCE AT THE GLOBAL LEVEL

After the release of the Fourth Assessment Report by the IPCC (2007) and the Stern Review (2007) it is evident that climate change is indeed a reality. The changes in the climatic indicators depict an unequivocal message about climate change. Changes in temperature (air and oceanic), precipitation and their irregularities, widespread melting of glaciers, snows and ice, SLR, increasing incidences of extreme events such as cyclones, storms, tidal surges, floods, landslides, heat waves in many parts of the world indicate clear changes in the global climatic conditions. Some of such changes are listed in the Box 1 and Figure 1.

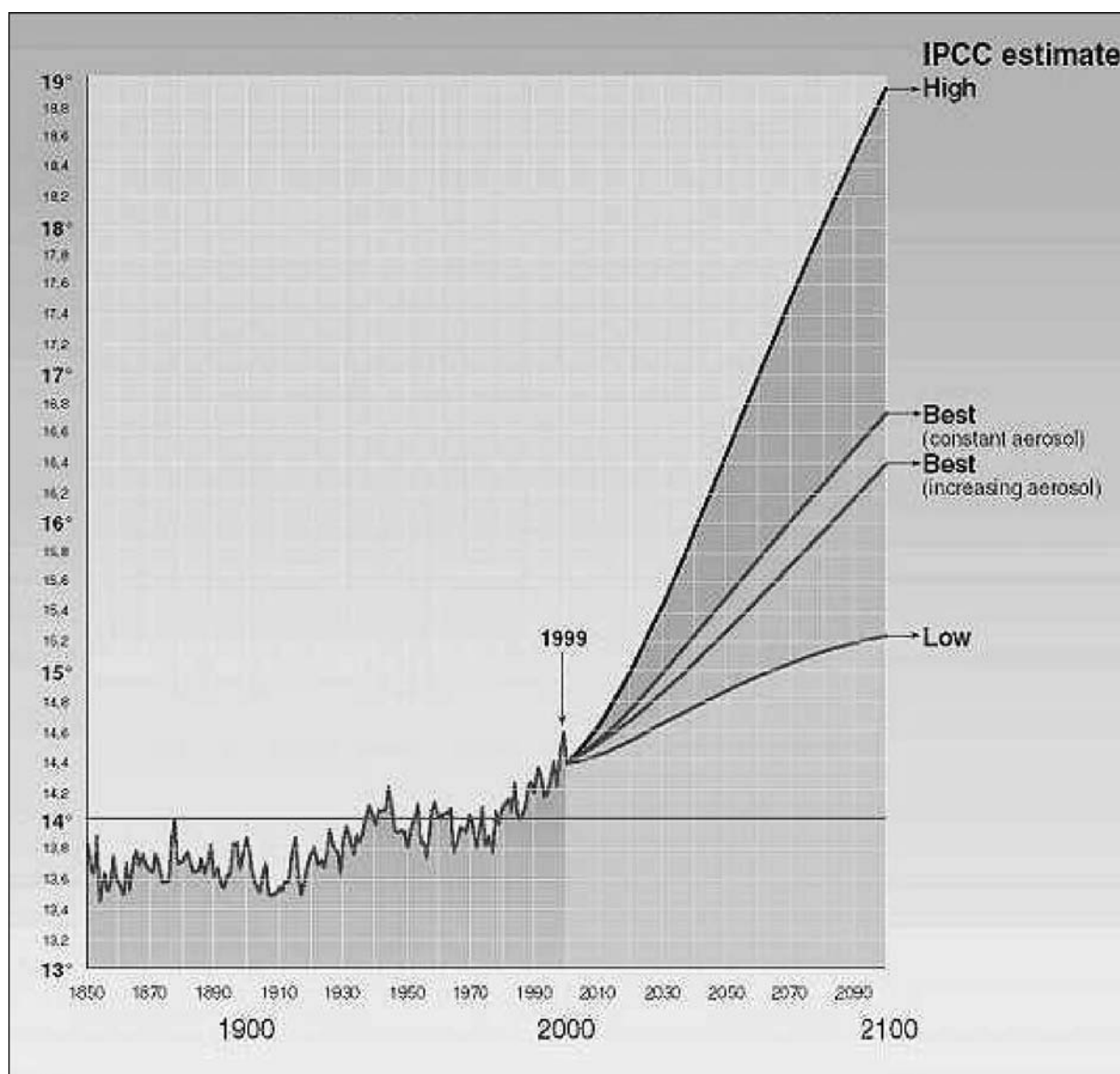
### Box 1: Some Facts on Climate Change

- Global atmospheric carbon dioxide (CO<sub>2</sub>) concentration has increased from 280 ppm to 379 ppm in 2005;
- CO<sub>2</sub> emission has increased by about 80 per cent between 1970 to 2003;
- Emission of almost all other GHGs have increased significantly during the same time periods;
- 11 of the last 12 years (1995-2006) rank among the 12 warmest years of surface temperature (since 1850);
- Global average sea-level rose at an average rate of 1.8 (1.3 to 2.3) (mm) per year between 1961 to 2003; and the rate for the 1993 to 2003 was 3.1 (2.4 to 3.8) mm;
- Globally about 20 to 30 per cent of plant and animal species are highly vulnerable (risk of extinction) to a change of temperature of 1.5 to 2.5°C;
- Over the 20<sup>th</sup> century, precipitation has mostly increased over land in high northern latitudes, while decreases have dominated from 10°S to 30°N;
- Glaciers and ice caps have experienced widespread mass losses and have contributed to SLR during the 20<sup>th</sup> century.

**Source:** IPCC (2007); Stern Review (2007).

The global evidences of climate change becomes more clear with the analysis of the trends of changes in climatic variables and their estimated future changes. Both the Third and Fourth Assessment Reports of the IPCC forecasted significant variations in climate changes with respect to seasonal and geographical locations. Figure 1 released by the UNEP (1999) shows how global temperature changing can reach upto an extreme level in the near future, putting our life and livelihood activities under serious risks.

Figure 1: Global Average Temperature and Projections



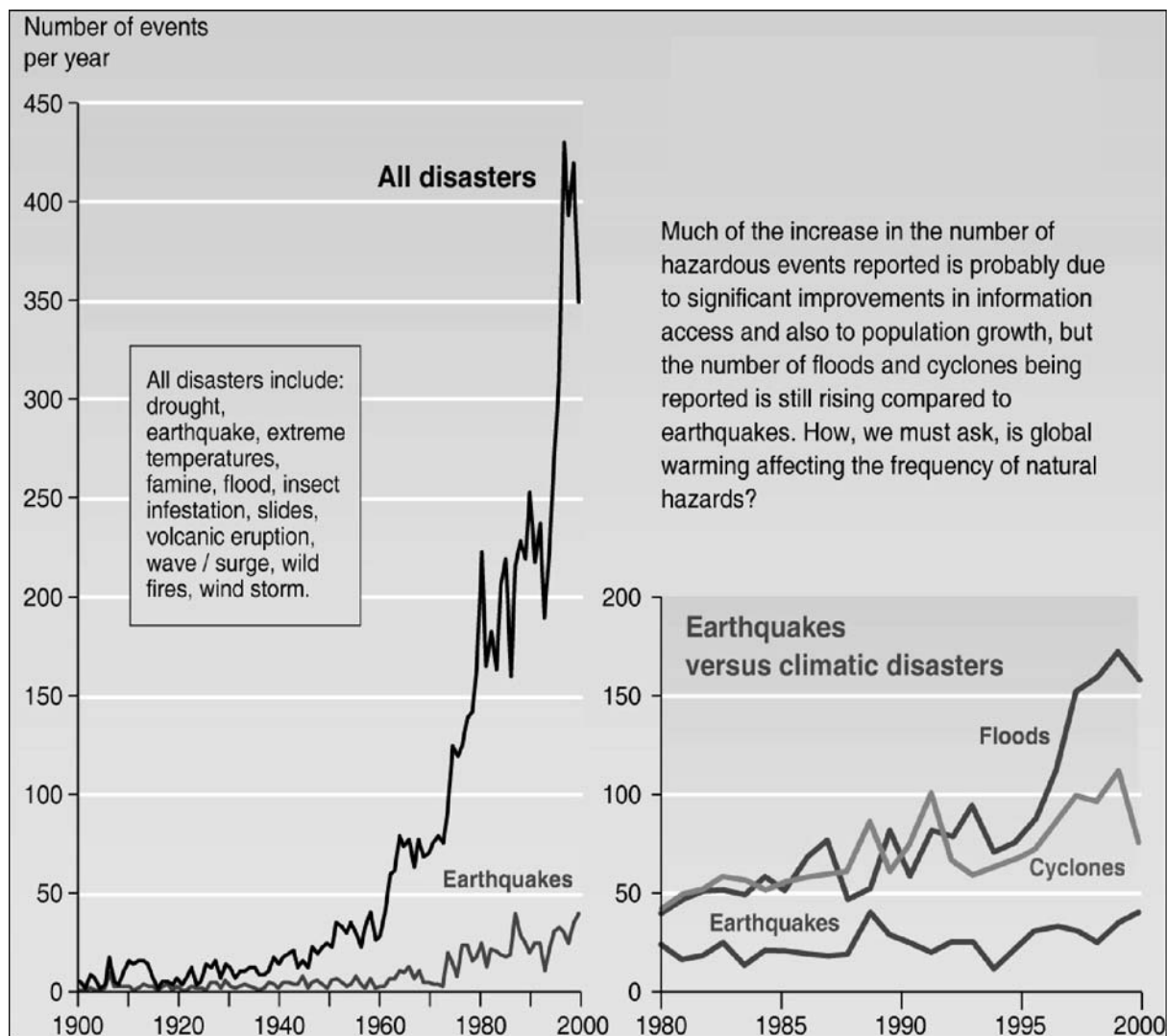
Source: UNEP/GRID Arsenal (1999).

Climate change at the global level will have impact on the overall structure of the world in the form of changes in its environmental, economic, sociocultural structures and livelihood activities of millions of people. And such changes in the developing countries due to their geo-climatic positioning will mostly be higher than the developed counterparts. Agriculture will be one of the severely affected areas; particularly the South Asia and the Sub-Saharan Africa will be the worst-hits. SLR will force millions to become “climate refugees<sup>3</sup>” in Bangladesh, Maldives and many smaller Asian and African Islands. There will be heavy loss for ecosystems and environment. Most ecosystems in the vulnerable countries will lose much of their resilience capacity. Globally, about 20 to 30 per cent of plant and animal species are highly vulnerable to risk of extinction due to a change of temperature between

<sup>3</sup>People who would be displaced from their homes due to climate change and its impacts, mainly because of increasing incidences of disasters, droughts, salt water intrusion into the cultivable land and reduction in land productivity in the coastal areas.

1.5° to 2.5°C (IPCC 2007). Millions of poor and indigenous people who are closely associated with nature for their sustenance will be seriously affected. Due to depletion of groundwater level, rapid melting of glaciers and SLR availability of drinking water and their sources will shrink. Economic opportunities and lives of over a billion Himalayans around Asia will be disrupted. With changes in climatic parameters there will be more incidences of epidemics and newer unknown health problems and hazards. Figure 2 shows how incidences of various natural disasters are increasing in the recent years mainly due to the changes in global climatic variables.

**Figure 2: Trends in Natural Disasters**



Source: UNEP/GRID Arsenal (2005).

All such changes in the climatic variables and natural phenomena will adversely affect the economic activities, and thus growth and development in mainly the developing countries. Many studies across the world have estimated economic losses due to global warming and climate change (Table 2). For example, the Stern Review (2007) has reported a one per cent estimated costs due to climate change in terms of the global GDP by 2050 if we fail to arrest

the negative impacts of climate change by undertaking required adaptation and mitigation measures.

**Table 2: Estimates of the Costs of Global Climate Change in Terms of Future GDP Levels**

Source	Estimated Costs in terms of Global GDP	Estimated Costs in terms of 2006 Global GDP*	Explanation
Stern Review (2007)	1%	€385/\$484 billion**	Costs by 2050. Stabilisation target: 450 ppm CO <sub>2</sub> or 500-550 ppm CO <sub>2</sub> e***.
Stern (2008)	2%	€771/\$968 billion	Costs by 2050. Stabilisation target: below 500 ppm CO <sub>2</sub> e.
UNDP (2007)	1.6%	€617/\$774 billion	Average annual costs between 2007 and 2030. Stabilisation target: 450 ppm CO <sub>2</sub> e, halving global GHG emissions by 2050 relative to 1990 levels.
Vattenfall (2007)	0.6%	€231/\$290 billion	Costs of limiting GHG concentrations to 450 ppm CO <sub>2</sub> by 2030. Focus on least cost opportunities.
European Commission (2007)	0.5%	€193/\$242 billion	Investment in a low-carbon economy over the period 2013-2030. Stabilisation target: 450 ppm CO <sub>2</sub> e.
OECD (2008)	0.5% in 2030 2.5% in 2050	€193/\$242 billion in 2030; €0.923/\$1.21 trillion in 2050	Reduction of GDP below baseline estimates in 2030 and 2050. Stabilisation at 450 ppm CO <sub>2</sub> e, reducing GHG emissions by 39 per cent by 2050 relative to 2000 levels.
IPCC (2007)	0.6% in 2030 1.3% in 2050	€231/\$290 billion in 2030; €501/\$629 billion in 2050	Average macroeconomic costs for multigas mitigation in 2030 and 2050. Stabilisation at 535-590 ppm CO <sub>2</sub> e (440-485 ppm CO <sub>2</sub> ).

**Source:** Behrens (2008).

**Note:** \*2006 global GDP at current prices was around €38.5 trillion (USD 48.4 trillion) (IMF 2008). Values in USD exchanged into Euro with the average 2006 USD/EUR exchange rate of 1.2556.

\*\* While Stern (2007) estimates one per cent global GDP to be around USD 350-400 billion, this study refers to global GDP data from the IMF to make estimations by different sources more comparable.

\*\*\* CO<sub>2</sub>e: Carbon dioxide equivalent.

### 3. CLIMATE CHANGE AND BANGLADESH

It is now well-established that Bangladesh is one of the most vulnerable countries from climate change, mainly due to its unique geographical location, hydro-geological characteristics like dominance of floodplains and low elevation from the sea. Disadvantageous socioeconomic characteristics such as high density of population, higher rate of poverty, overwhelming dependence on nature and nature-based livelihood activities also contribute to this vulnerability.



### 3.1 Signs of climate change in Bangladesh

#### *Change in Temperature*

Bangladesh is a tropical country with a hot and rainy summer and a dry winter season. The IPCC (2001) projection indicates that the earth will experience an increase of its temperature by 1.0°C to 3.5°C over the next 100 years. In Bangladesh too such changes can be seen as are estimated by many studies. For example, the study by BUP-CEARS-CRU (1994) reported an increase of temperature by 0.5°C to 2.0°C by the year 2030, while another study projected the value as 0.3°C for 2010, and 1.5°C for 2070 (ADB 1994).

#### *Change in Rainfall*

Rainfall plays a significant role in the climatic condition of Bangladesh as it receives one of the highest average rainfalls in the world. It is projected that the variability in rainfall will be higher in the coming years due to climatic changes. Currently, average annual rainfall in drier areas of Bangladesh is approximately 1500 mm while the wetter regions receive around 5000 mm. It is reported that Bangladesh can experience an increase of its overall rainfall by 10 to 15 per cent by the end of 2030 (BUP-CEARS-CRU 1994). Table 3 provides an idea about the changes in rainfall and temperature with seasonal variations.

**Table 3: Projected Changes in Climatic Conditions of Bangladesh**

Year	Mean Temperature Change (C)			Mean Rainfall Change (mm)		
	Annual	December - February	June - August	Annual	December - February	June - August
Baseline 2030	+1.0	+1.1	+0.8	+3.8	-1.2	+4.7
2050	+1.4	+1.6	+1.1	+5.6	-1.7	+6.8
2100	+2.4	+2.7	+1.9	+9.7	-3.0	+11.8

Source: Agrawala *et al.* (2003).

#### *Sea Level Rise (SLR)*

One of the most devastating consequences of climate change for the low-lying countries like Bangladesh will be the gradual SLR. Due to rapid melting of glaciers and icebergs the sea level is expected to increase with the increasing pace of climate change in the coming years. According to the IPCC (2001) projection, there can be an increase of sea level by 5-88 cm by the year 2100. In the scenario-based models of the Fourth Assessment Report of the IPCC (2007) the minimum SLR was reported to be 18-38 cm by 2100. Table 4 provides the projected changes in SLR and sedimentation level in Bangladesh.

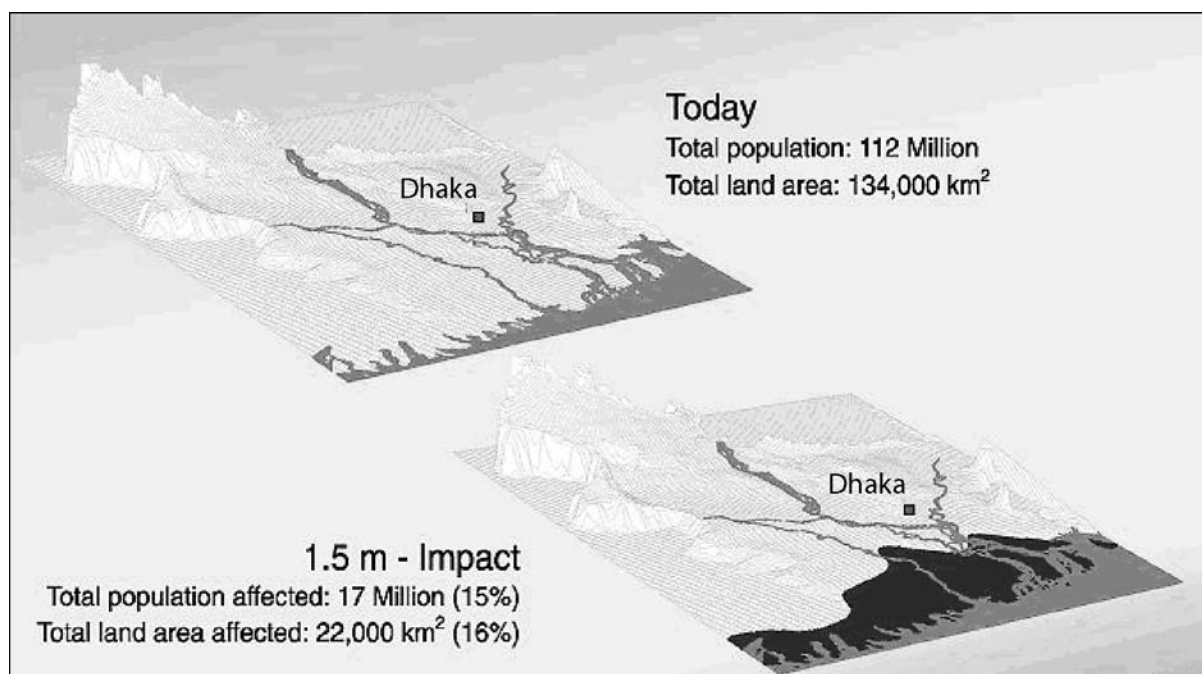
**Table 4: Projected Changes in Sea Level Rise and Level of Sediment of Bangladesh**

Year	Sea Level Rise (in cm)	Sediment (Area in sq km)
2030	14	325
2050	32	700
2100	88	1350

Source: IPCC (2001), (2007).

The IPCC (2007) forecasted that a mere 1 m rise in sea level will inundate 20 per cent of her landmass resulting in loss of much of her coastal regions permanently. As most of the land in Bangladesh exceed barely 10 m from the sea level, SLR will inundate a major portion of its coastal areas. Figure 3 released by the United Nations Environment Programme (UNEP) shows how sea water may intrude the mainland of the coastal areas of Bangladesh from a mere 1.5 m rise in the sea level.

**Figure 3: Potential Impact of Sea Level Rise on Bangladesh**



Source: UNEP/GRID Arsenal (2000).

### **Extreme Events**

The intensity and frequency of extreme events such as floods, cyclones, storms, and tidal surges have increased significantly in the recent years, some of which have devastating impacts on the environment and economy. In Bangladesh such incidences are clearly visible. For example, on 15 November 2007 the cyclone *Sidr* hit on the 22 south and south-western districts of Bangladesh and killed over 3,000 human lives and thousands of animals, besides damaging agricultural produces and coastal ecosystems. Nine million people were affected by this powerful cyclone. The Government of Bangladesh (GoB) reported that the heavy storm of about 150 km/h with a 20 feet tidal wave affected about 6,851,147 people from 1,611,139 families in 200 upzilas/sub-districts. It also fully damaged about 461,819 acres of crops and 365,670 houses (Islam 2008). It is predicted by experts that such incidences will increase in the coming years.

### **3.2 Impact of Climate Change in Bangladesh**

Bangladesh is estimated to become one of the most vulnerable countries from global warming and climate change. The impact of climate change in Bangladesh will be higher due to its geo-physical location, economic and demographic disadvantages, and overwhelming

dependence on nature-based livelihood activities (some of the climatic impacts are listed in the Box 2). Climate change in Bangladesh may jeopardise the economic, ecological, social and cultural lives of the country.

### **Box 2: Impacts of Climate Change on Bangladesh**

- Average increase in temperature in Bangladesh would be 1.3°C in 2030 and 2.6°C for the year 2070;
- There will be seasonal variation in temperature in Bangladesh: 1.4°C in the winter and 0.7°C in the monsoon in 2030, and in 2070 the figure will be 2.1°C and 1.7°C, respectively;
- By 2030, an additional 14.3 per cent of the country would become extremely vulnerable to floods, while existing flood-prone areas will face increasing flooding;
- A mere one metre rise in sea level will inundate 18 per cent of landmass and directly affect 11 per cent people and virtually will force to loose the Sundarbans;
- Monsoon rainfall may increase by 11 per cent and 27 per cent by the year 2030 and 2070, respectively;
- Upto 40 per cent of investment in development and infrastructure will be affected due to climate change;
- General cyclonic activity in the Bay of Bengal has become more frequent, in the recent times creating rougher seas;
- Due to changes in the hydrological cycle there can be epidemic morbidity and mortality (mainly due to diarrhea);
- Increased coastal temperature will cause diseases in the coastal districts of Bangladesh.

Source: IPCC (2001), (2007); Deb *et al.* (2009).

Various possible climatic impacts in Bangladesh are broadly categorised as follows:

#### ***Economic Impact***

The economic activities of Bangladesh will be seriously affected due to changes in climatic conditions, SLR and migration from rural to urban areas. Due to excessive rainfall, rapid melting of the Himalayan glaciers and heavy flows from upstream rivers, there will be terrible floods in Bangladesh during the rainy season. The situation will become worse from increasing siltation. Due to desiccation of soil for shortage of rainfall, soil salinity in Bangladesh is increasing. In 1973, about 1.5 million hectares of land was under mild salinity, it increased to 2.5 million hectares in 1997, and to about 3.0 million in 2007. Also, with the changes in climatic condition the incidences of extreme events such as cyclones, storms and tidal surges will be more frequent in Bangladesh. A study by BCAS-RA-Approtech (1994) reported a 10 per cent increase in the intensity of cyclone in Bangladesh due to climate change in future, leading to greater economic loss. With changes in agricultural production, trade and service sectors may also be affected. The situation will be worsening due to migration of the “climate refugees” to urban areas in search of better life.

### Box 3: Impacts of Climate Change on Bangladesh Agriculture

- Crop yields can reduce up to 30 per cent in South Asia by the middle of 21st century;
- Bangladesh will lose about 8 per cent of its rice and 32 per cent wheat production by the year 2050;
- Already about 830,000 hectares of arable land has been affected by varying degrees of soil erosion and will increase in the coming years;
- It is possible that up to 40 per cent of the country will be flooded in the regular monsoon period instead of 25 per cent now;
- Drought affects annually about 2.32 million hectares in the *Kharif* season (November-June) and 1.2 million hectares of cropland during the Rabi season (July-October);
- Soil salinity, water logging and acidification affect 3.05 million, 0.7 million and 0.6 million hectares of cropland respectively, annually;
- 49 districts of Bangladesh and 59.45 per cent of the total area used for rice production will be affected due to droughts by 2030;
- 55 to 62 per cent of rice yields (58.5 per cent) and 2.43 per cent of total production will be affected due to drought by 2030;
- Due to inundation of saline water 16 districts will be affected by 2030 (in 2000, around 57 per cent area of these districts were affected, whereas by 2030 it will reach up to 59.7 per cent);
- Due to inundation 55,000 hectares of paddy land and 121,000 tonnes of paddy will be lost by 2030;
- Soil salinity will affect total 13 districts and will cover 20.37 per cent of total paddy area with a potential loss of 395,000 tonnes of rice.

Source: GoB (2008); Deb *et al.* (2009).

Currently, agriculture contributes 21 per cent of Bangladesh's GDP and employs about 50 per cent of her total workforce (BBS 2009). Due to climate change, productivity of crops will reduce sharply. A global climate change model shows that the overall global crop productivity will reduce by 20-30 per cent because of climate change, and South Asia is particularly vulnerable from it. Aman rice production will be reduced due to greater incidences of floods and longer duration of flooding, while reduction of Boro rice area will be intensified due to limitation in surface water and depletion of groundwater level. SLR, salt water intrusion in the southern low-lands of Bangladesh and soil salinity in many parts of the country will permanently affect much of its cultivable land. Out of its 2.5 million hectares of coastal land about 0.83 million hectares of land along the coastal belt are under salinity of different magnitudes.

#### **Ecological Impact**

Excessive pressure from overgrowing population and lack of effective institutional mechanism, along with changes in the climatic conditions of the country, deforestation, loss of biodiversity, increased pollution, loss of waterbodies, etc. will increase in near future. In addition to seasonal storms and cyclones more devastating extreme events are expected to hit the country very often. The severity from the *Sidr*, *Aila* and *Nargis* cyclones are some of the early indications of a hard future for the coastal Bangladesh. Such events have devastating impacts on the ecology and environment of the coastal districts of Bangladesh. Experts opine that the Sundarbans ecosystems were severely affected (some study also claimed up to 30 per cent damages of its ecology) by the *Sidr* cyclone. Moreover, intrusion of salt water into the south-western districts of Bangladesh may cause serious damage to land productivity and its terrestrial ecosystems. On the other hand, droughts in the Gangetic plains and the Barind zone will jeopardise their overall ecological systems. Major

waterbodies of their country such as rivers, lakes, *haors*, *baors* and *beels* will lose much of their natural ecological conditions with climate change. Large-scale migration from affected areas to the cities will also affect the urban environment, especially due to increasing stock of solid waste and sewage, increasing traffic congestion, and more burning of fossil fuels for transportations and machineries.

### ***Sociocultural Impact***

Along with economic, ecological and environmental changes there will also be changes in the overall sociocultural structure of the society. Bengali culture has a strong bond with its natural surroundings. Traditional Bangladeshi cultures, customs of many smaller and indigenous communities will be under serious threats from climate change as it will affect the traditions from where the economic and environmental conditions are rooted in. Changes in natural diversity will have an impact on the cultural diversity of the society as these are closely linked to each other (Bhatt and Islam 2008).

### ***Health Hazard***

Another important impact of climate change will be on human health. Various forms of health hazards and risks will affect the people of Bangladesh badly with increasing impacts of climate change. This will be much severe in Bangladesh due to the weak resilience capacity and lack of resources for their prevention. Extreme events and environmental changes may take heavy toll on human lives and their properties. Changes in environmental quality, loss of ecosystems and biodiversity may cause newer diseases along with lack of preventive capacities (due to loss of environmental and biological resources). Displacement of population and increased migration to urban areas will create heavy pressure on the existing poor health facilities of the cities, and the environmental condition will only become worse. Reduction in freshwater supply is another serious problem which will badly affect public health. The poor, women and children will be particularly vulnerable to climate-related health hazards.

## **4. TOWARDS COPENHAGEN: MAJOR MILESTONES**

The Copenhagen Conference 2009 is the final step towards creating a new and effective global agreement on climate change replacing the Kyoto Protocol which is expected to end in the year 2012. The Roadmap created in the Bali Conference in 2007 by the global communities on the basis of the IPCC's Fourth Assessment Report for launching a comprehensive process to enable the full, effective and sustained implementation of the climate convention is expected to be finalised in the upcoming UN conference in Copenhagen in December 2009. Despite many adversaries and poor progress in ground level preparations before the COP-15, the world is looking forward to a better global policy agreement which will address the problem of climate change in a more comprehensive and dynamic way. Despite many negotiations and meetings of the parties after the Bali Conference for finalising the Copenhagen Draft on global climate policy, the stock of progress on Bali Action Plan is not satisfactory. Yet some recent indications from the developed countries and emerging economies like China and India as well as changes in global political scenarios have increased expectations on a successful COP-15.

#### **4.1 Kyoto Protocol (1997)**

In the Earth Summit held in 1992 the world agreed to establish the UNFCCC with the aim for “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” Throughout the 1990s many important international events were organized and significant works had been done on various aspects of climate change. Out of them the Kyoto Protocol (1997) was a significant breakthrough in the history of climate change negotiation. By 2005, the Kyoto Protocol became an international agreement despite opposition by many countries such as the United States (US). The upcoming Copenhagen Conference bears immense significance as the world community hopes to formulate (or replace the Kyoto Protocol by) an ambitious and effective policy document to control the menace of climate change. The conference is also expected to discuss the very important issue of raising climate funds and helping those countries who are the victims.

#### **4.2 Bali Road Map (2007)**

The Bali Conference made a roadmap aimed at hammering out a new ambitious global climate agreement by December 2009 in Copenhagen which will replace the Kyoto Protocol (beyond the year 2012). The main purpose of the Bali Roadmap was how to deal with the problem of climate change efficiently, and make an ambitious and effective policy documents involving all parties together. The main agendas for this conference were:

- (i) Negotiations on a new international climate change agreement;
- (ii) Discussion on the issue of adaptation to climate change;
- (iii) Possibility of launching an adaptation fund;
- (iv) Ways to reduce emission from deforestation;
- (v) Issues related to carbon market; and
- (vi) Review of the Kyoto Protocol

The Bali Roadmap has five elements:

- (1) A shared vision for long-term cooperative action, including a long-term global goal for emissions reductions;
- (2) Enhanced national/international action on climate change mitigation;
- (3) Enhanced action on adaptation to climate change;
- (4) Enhanced action on technology development and transfer to support action on mitigation and adaptation; and
- (5) Enhanced action on the provision of financial resources, investment to support action on mitigation and adaptation, and technology cooperation.

Despite achieving significant success, the conference had many lacking on the areas of:

- No clear-cut aim for cutting emission before or after 2012;
- No exact vision from the developed countries about their contribution for the proposed “climate fund;”
- Inclusion of development aid as a possible fund is another gross mistake which may divert the fund for other areas;

- The rejection of the proposal of “Technology Cooperation Fund” by the conference and besides recognising the need for a financial mandate there was no clear commitment from the developed states during the conference.

#### **4.3 Poznan Climate Conference (2008)**

The Poznan Conference had the specific goal of creating a legally binding regime for carbon reduction by creating a successful ground for the proposed climate policy. Major agenda for the Poznan Conference was to lay successful groundwork for Copenhagen Conference and pave the way to successful creation of a successor to the Kyoto Protocol. These include issues related to creating funds for mitigation and adaptation, concrete policies and targets for cutting carbon emissions in the developed countries, and transfer of technologies to the developing countries.

The much expected COP-14 at Poznan was by and large a failure on many grounds. The positive outcomes from this conference were far from satisfactory. Due to the unwanted delay and lack of cooperation from the developed countries, and a group of under developing countries the outcome turned to be less satisfaction. However, certain steps were taken which are worth mentioning:

- Management of a UN “Adaptation Fund” to help developing countries was the most significant concrete development from the conference;
- Funds raising from using a 2 per cent levy on carbon trading under the UN Clean Development Mechanism can now be disbursed among the developing and affected countries;
- Progress on how environment-friendly technology can be transferred to developing countries;
- Agreement that deforestation needs to be reduced; and
- Recognition that the situation is quite urgent.

Poznan Conference generated more or less of certain mixed outcomes and could not make any major breakthrough. It was mainly the bifurcation which was created among the member states. There was little cooperation between developed and developing countries to come forward to a common platform for further negotiation. The overall environment was also very gloomy due to the financial crisis which the world was going through. Any concrete target related to reduction of carbon emission, mid and long-term reduction and finance, could not be reached.

#### **4.4 Geneva Climate Conference (2009)**

The issue of using science for regional, national and global climate mitigation and adaptation policies was one of the focal points of the World Climate Conference-3 (WCC-3) held during 31 August-4 September, 2009. It stressed on how humankind can benefit from the advances in climate prediction and information services to manage climate-related risks as a way of developing resilience through adaptation, and aimed to create a Global Framework for Climate Services. The Framework aims to enhance climate observations and monitoring, transform that information into sector-specific products and applications, and disseminate those products widely.

The outcome of the Geneva Conference was significant despite not reaching upto its potential level. The conference has opened the door to establish a Global Framework for Climate Services. It also aims to increase commitment to, and advancements in, climate observations and monitoring to better provide climate information and services worldwide that will improve public safety and well-being. It intends to contribute for achieving the United Nations Development Programme's (UNDP) MDGs and reduction of disaster risks throughout the world.

#### **4.5 Barcelona Climate Talks (2009)**

The Barcelona Climate Talks were the last set of negotiations followed by the Bangkok Round of Talks before the final meeting in Copenhagen. The talks started with the Climate Draft from the Bangkok Round for further consensus on the following issues:

- (i) Climate adaptation;
- (ii) Technology cooperation by the developed countries;
- (iii) Action to reduce emissions from deforestation in the developing countries;
- (iv) Enhanced capacity building to face the impacts of climate change efficiently.

Barcelona meeting was assumed to be a very crucial one as it was the last chance for a negotiation on the new global climate agreement which was dreamed at the Bali Conference, 2007. Unfortunately, the overall outcome from the Barcelona was not satisfactory. The depressive outcomes mainly were the results of the non-cooperative attitudes of the industrialised states who are the major contributors to GHG emissions. The very expected consensus on issues like immediate funding for climate adaptation for the developing and sufferer countries, a firm promise of emission reduction targets by the developed countries were not achieved despite an understanding on the need for strong commitments from them.

Despite lack of clear consensus and failure to act timely in the Barcelona Talks, there were a few positive achievements which are significant for the upcoming Copenhagen Conference. These were mainly in the areas of climate adaptation; technology cooperation; realisation for a legally-binding global deal to limit GHG emission; reduction of emissions from deforestation by developing countries; and mechanisms to disburse funds for the developing countries.

It is now obvious that despite considerable progress, it is far-lacking in meeting the desired goals for reaching to Copenhagen with a well-prepared policy draft. This can be attributed to a number of reasons: (i) no significant breakthrough has been achieved till today due to very slow process to convert documents of the proposals of the parties into text for final negotiation round; (ii) there is lack of sincerity on the part of the developed countries with a mind to solve the issue of climate change efficiently; (iii) no clear consensus between emerging economics and the developed countries for finalising the draft of the policy on issues like emission cuts; (iv) issues like raising adaptation funds and ensuring early access of funds for fighting climate change by the affected countries, transfer of green technologies and the question of helping the sufferers in achieving a low-carbon economic growth have not been progressed properly as needed for the final policy approval in the Copenhagen; (v) the time is too less before the main conference for expecting some significant outcomes.



Keeping in mind the adversaries, there is need for further negotiations and cooperation among all UN member states, and particularly by the developed countries and the emerging economies (e.g. China and India) for making the upcoming event a successful one.

## 5. ISSUES FOR BANGLADESH

The GoB has taken the issue of climate change very seriously in its overall policies and actions. It considers climate change a development challenge rather than an environmental or geo-climatic problem. Since the inception of the UNFCCC in 1992, Bangladesh has actively participated and demonstrated its willingness and sincerity for a proper solution of the problem of global warming and climate change. She is a signatory (in 1992) of the UNFCCC and has ratified it in 1994, and strongly supported the Kyoto Protocol which entered into force in the year 2005. The GoB has taken various steps to minimise the impacts of climate change in Bangladesh. Besides creating a national climate adaptation fund the government has formulated the National Adaptation Programme of Action (NAPA) 2005 and Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2008 which has been revised in 2009. The BCCSAP 2009 has identified six priority areas: food security, social protection and health; comprehensive disaster management; infrastructure; research and knowledge management; mitigation and low carbon development, and capacity building and institutional strengthening.

Each of these identified areas would require very careful policy guidelines. There is need for capable manpower, technologies, resources for such programmes and projects to be effectively implemented. For example, climate change will badly affect the overall agricultural sector in Bangladesh and thus the question of food security is in real stake. There is a need to take immediate actions to ensure food security for avoiding any unwanted circumstances in future. Problems like health hazards and social protection are other areas which require long-term policies. The Draft Disaster Management Act (2008), Draft National Plan for Disaster Management (2008-2015) and Draft National Disaster Management Policy (2008) of the GoB outline these issues. However, formulation of policies is not the end but only a step towards dealing with the problem. Effective implementation of plans requires careful operational strategies alongwith provisions for enough resources. Bangladesh does not have the required resources and technological know-how to undertake immediate measures towards adaptation and mitigation actions.

Besides seeking global support Bangladesh also needs to take several domestic measures to facilitate policies to combat the impact of climate change. These include: identifying vulnerable areas into different categories; estimating the extent of possible loss to the economy due to climate change; identifying the various adaptation and mitigation measures required to face climate change and their estimated costs; exploring probable sources of finance for its adaptation and mitigation programmes. A well-planned institutional set-up, technical know-how and capable human resources and able leadership can enhance the capability of the country to face climate change.

The Copenhagen Conference is very important for Bangladesh not only for climate adaptation funds but also for an ambitious and improved global climate policy with equity and justice based on “polluters pay principle.” Although Bangladesh is not a significant

emitter of GHG there is little scope to be a mere spectator doing nothing. Timely adaptation measures can minimise losses and help the country face the negative impacts of climate change effectively. As the adaptation and mitigation policies require large amount of resources, the country has to bargain on the compensation package from the global communities. Finance for adaptation, technology transfer and enhancement of local innovation, market access for its goods and services, providing timely and ensuring easier access to information are some of the issues which are critical for Bangladesh. While these issues are mentioned in the BCCSAP 2009, some of the issues are either missing or need to be highlighted at a greater extent. As the climate talks enters shortly into multilateral negotiations in Copenhagen, Bangladesh has to clarify its position on a number of issues. Some of these issues are discussed below.

### 5.1 Adaptation versus Mitigation

Various articles of the UNFCCC calls for adaptation to climate change. Article 4.1(b) of the convention mandates that all Parties are to “formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to ... facilitate adequate adaptation to climate change.” While adaptation is seen as crucial, the major contentious issues as regards adaptation are financing and institutional arrangements. Other adaptation related issues such as the definitions of adaptation action and eligible activities, risk reduction and sharing, monitoring, and capacity building, though important can probably be postponed for negotiation at a later point.

Bangladesh contributes negligibly to the global GHG emission. With only one-fifth of one per cent of world total in terms of GHG emission major focus of Bangladesh is to devise adaptation policies and measures. Measures are required in the following areas, among others.

- *Agriculture, forestry and fisheries* – resistant crop and livestock varieties, diversification of activities for rural communities, advancing food security (seed and food banks), community-based forest projects, improving veterinary services, promoting agricultural techniques and irrigation methods to fight salinity
- *Water supplies* – protect water infrastructure, improve management of surface water, construct storage facilities, water harvesting, improve watershed management, raise community awareness
- *Extreme events* – installation of early-warning systems, measures for flood prevention (e.g. flood dykes) and coping with droughts, community disaster preparedness and response capacity
- *Capacity building including research* – upgrade meteorological services, explore options for insurance, research on crop varieties, awareness raising and information dissemination
- *Coastal zones* – integrated coastal zone management, construct and upgrade coastal defenses and causeways, mangrove planting
- *Natural ecosystems*
- *Infrastructure* – development of communications and telecommunications infrastructure, road protection

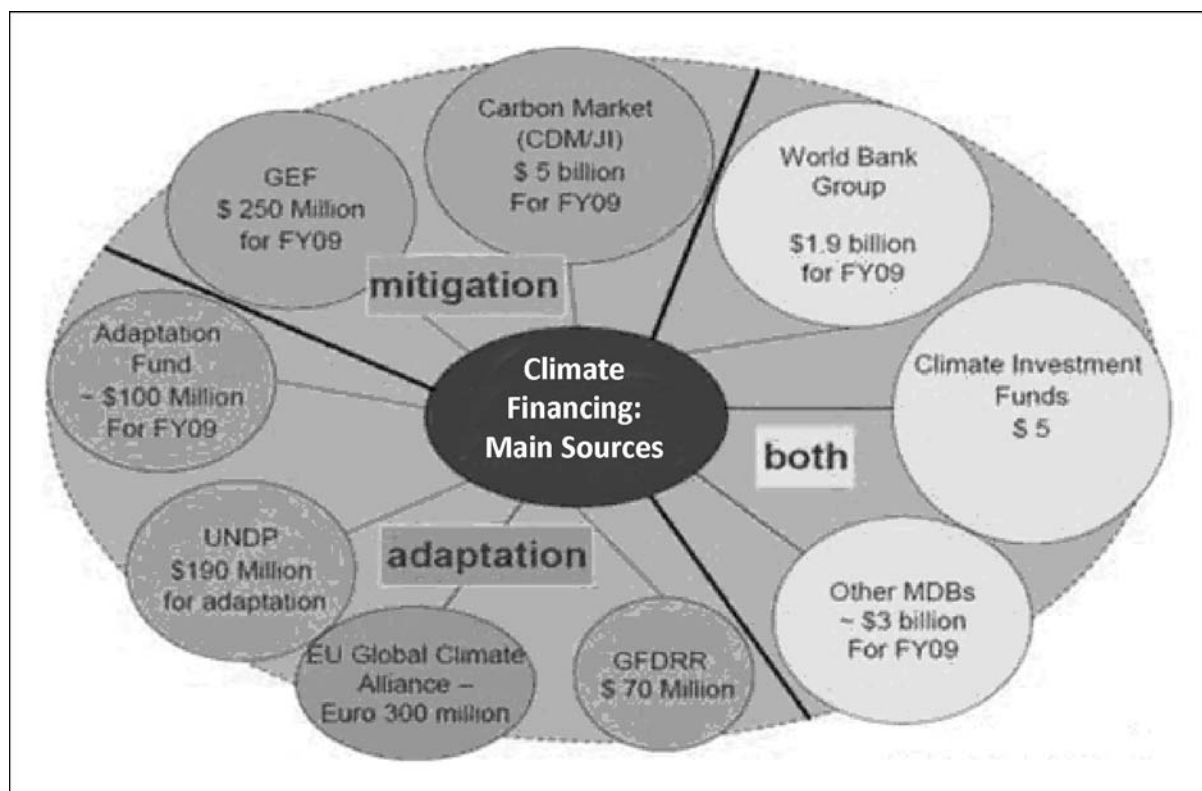
- *Human health* – development of health infrastructures, increase immunisation, measures to combat spread of malaria, training and awareness raising of medical personnel
- *National policies*

Article 4.4 of the convention mandates, “The developed country Parties ... shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects,” while Article 4.9 says “The Parties shall take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding and transfer of technology.” Bangladesh can demand for adaptation finance in view of the commitments delineated in the UNFCCC convention.

## 5.2 Financing Climate Change

The Copenhagen negotiation will focus on separate international funds for adaptation and innovation. There are arguments that the current level of funding for climate change mitigation is insufficient, with some even suggesting that the same level of funding be applied to this initiative as was appropriated to deal with the financial crisis. The World Bank is a major manager of climate funds. However, recently LDCs, various non-government organisations (NGOs) and civil society organisations (CSOs) are no longer interested in the World Bank as a fund administrator. With the current uncertainties of fund management, roles of the fund administrators, and given uncertainties in the measurement of emissions (which creates uncertainties in cost-benefit analysis, making the effectiveness of projects difficult to judge), a deadlock has been created. One of the fundamental questions regarding finance is where it will come from. Will it be direct contributions from developed country governments, as preferred by developing countries or market mechanisms, as preferred by developed countries? There are several proposals on the table to provide the necessary financing, which developing countries claim will be on the order of hundreds of billions of USD per year (for example, see Figures 4, 5 and 6). Mexico has proposed a Green Fund, to be financed through assessed contributions by developed countries. Such a proposal would require negotiating which factors will be used to assess individual contributions, with likely candidates including GDP, emissions, population, historic emissions, and combinations thereof. Various other countries have made financing proposals, including to auction emission allowances as a way to raise revenue (Norway); creating a global carbon tax of around USD 2/ton (Switzerland); issuing carbon credits based on Nationally Appropriate Mitigation Actions (NAMAs) as a way to raise revenue for developing country mitigation (Korea).

Figure 4: Estimates of Existing Resources and Financing Instruments Dedicated to Climate Change

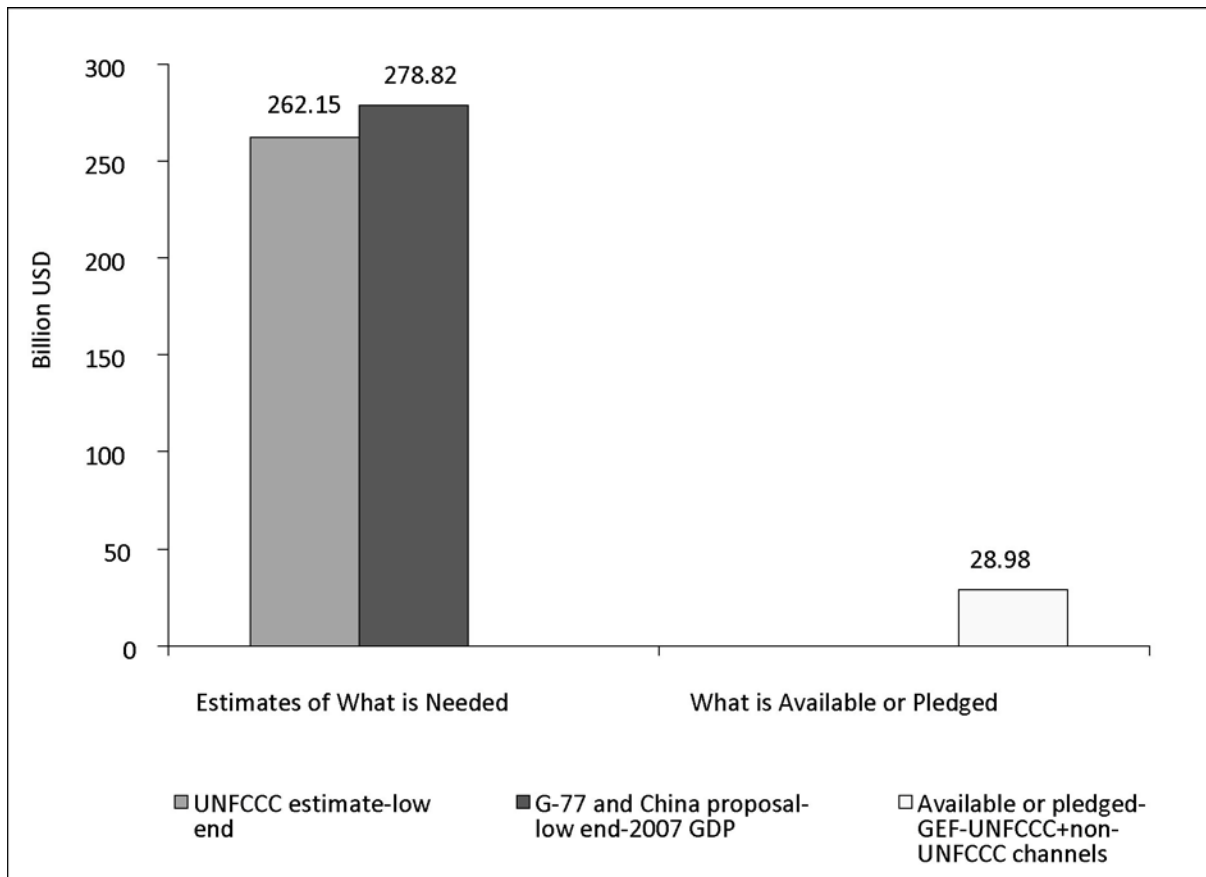


Source: Behrens (2008)

Note: FY2008-09 estimates are projections.

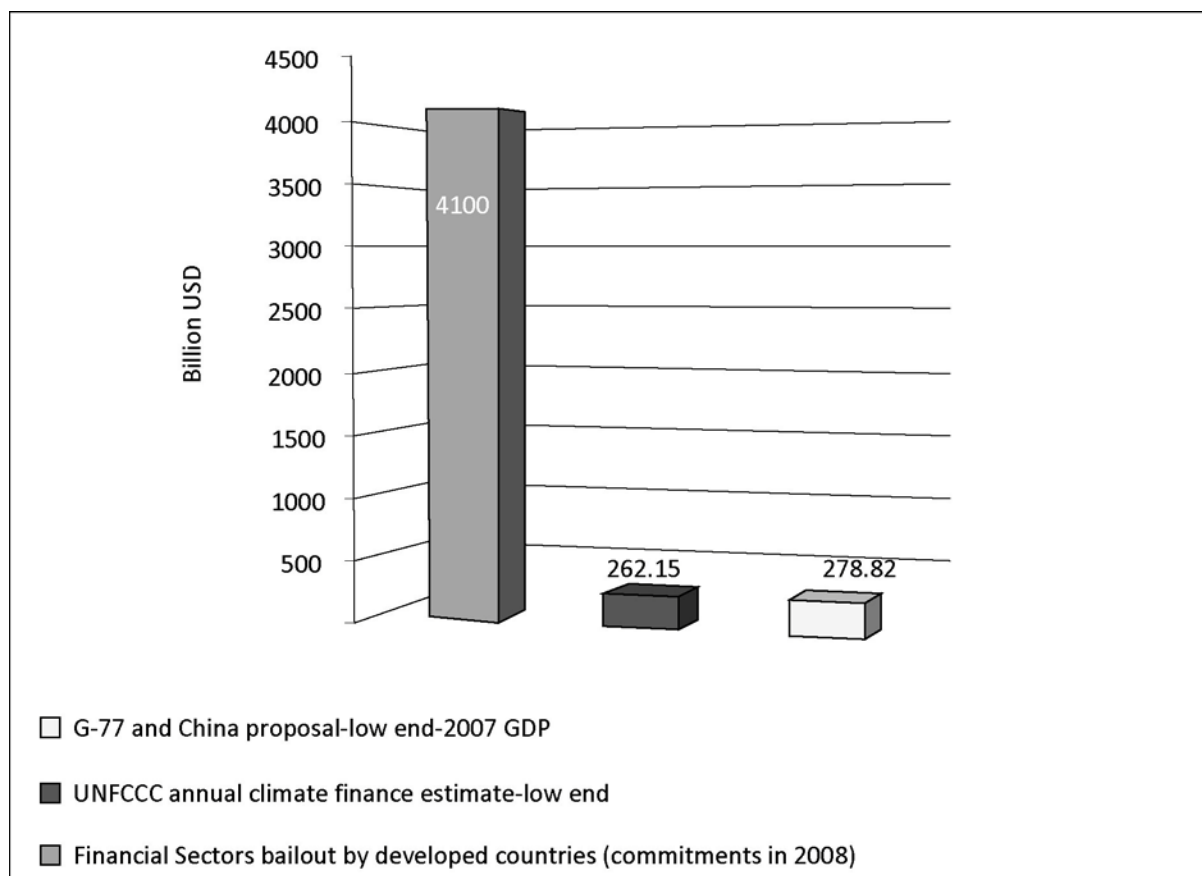
CDM: Clean Development Mechanism; JI: Joint Implementation; GEF: Global Environment Facility; GFDRR: Global Facility for Disaster Relief and Recovery; MDB: Multilateral Development Bank.

**Figure 5: Climate Financing Mismatch between Needs and Availability**



Source: South Centre (2009).

**Figure 6: Comparison of Financial Sector Bailouts by Developed Countries and Estimated Climate Financing Needs**



Source: South Centre (2009).

However, the question is not only about how to raise the money, but also about how finance is channeled and governed. Public financing is generally channeled through large centralised funds while market-based financing is typically delivered through myriad individually developed projects. Large funds have issues with governance, conditionality, efficiency and direct access; while market mechanisms have issues of distribution, sustainability, effectiveness and unintended consequences.

Over the last 35 years, the GoB made investments in the area of flood management schemes, coastal polders, cyclone and flood shelters, and the raising of roads and highways above flood level. Recently, GoB is working towards building up a climate fund to address the climate change. In FY2008-09, the government established a National Climate Change Fund worth USD 45 million while in the national budget of FY2009-10, an additional USD 105 million was added to this fund. The United Kingdom (UK) pledged to grant Bangladesh a total of USD 132 million for its adaptation and mitigation options.

However, the requirement for dealing with climate change is far greater. The Comprehensive Action Plan (2009-2014) on climate change prepared by the GoB estimated USD 500 million for implementing its first two years. Proposed activities under this plan include immediate actions such as strengthening disaster management, research and

knowledge management, capacity building and public awareness programmes, and urgent investments such as cyclone shelters and selected drainage programmes. The Action Plan estimates that USD 5 billion will be needed for the first five years. Hence, the challenge for Bangladesh is to scale up investments funds for climate change in order to create a suitable environment for the economic and social development of the country, and to secure the well-being of her people, especially the poorest and most vulnerable groups, including women and children.

Apart from various bilateral and multilateral sources, new sources of climate funds can be explored. One such source could be "Aid for Trade" (A4T) set up under the auspicious of the World Trade Organization (WTO) during the course of the Doha Round negotiation on global trade. The objective of the A4T is to help the poor countries overcome supply-side constraints that act as barriers to benefit from multilateral trading system. Such aid is well suited in case of developing trade-related infrastructure which is affected due to climate change.

Vulnerability of Bangladesh and its people can be reduced if sustainable development and other goals address and integrate climate risks. Adaptation to climate change and climate risk management should therefore be part of Bangladesh's development planning. Major expectation of Bangladesh from the global community is that equity must be ensured, justice delivered, and commitments are adequate and in time while compensating climate victims, climate refugees, and helping those vulnerable to cope with climate challenges. Bangladesh has to reiterate its urge to the international community for ensuring an equitable climate regime with adequate flow of funds. Developed countries that have obligations must ensure that adequate resources are available and accessible in time, so that timely investment can be made for sustainable development and also for making development resilient to negative impacts of the changing climate.

### **5.3 Technology Transfer**

Transfer and diffusion of environmentally sound technologies, in particular to developing countries, is a key element of any effective international response to the global climate change challenge and one of the pillars of the UNFCCC. The Bali Plan of Action also called for enhanced action on technology development and transfer. For adaptation and mitigation of climate change, developing countries and particularly the LDCs will need support from the developed countries, especially for resource and technology transfer.

In case of technology transfer the main issues on the table are technology financing, research and development, type of non-finance instruments to be used for promoting technology transfer, including intellectual property rights (IPRs), and institutional arrangements. Whether and how to modify the IPR regime to optimise development and transfer of climate technologies is in fact the central issue in the discussion. Developing countries proposed for relaxation of IPRs, compulsory licensing and patent pooling, exemptions, and provisions of incentives for patent holders to transfer patents to developing countries. Developed countries generally support maintaining the current IPR regime. Under Article 66.2 in Trade Related Aspects of Intellectual Property Rights (TRIPS), developed countries are required to provide incentives to their national enterprises to promote transfer of technologies to LDCs. It is believed that such transfer will support the

establishment of sound and viable uses of technologies among these Member states, helping to encourage growth and innovation. Developed countries are not effectively implementing this article, and as such, are not fulfilling their obligations under the WTO.

Institutional arrangements for technology transfer are also issues for debate on the road to Copenhagen. The main tripping points here will likely be the rank and mandate of the technology “body.” Developing countries proposed for UNFCCC subsidiary body on technology, as to maintaining the current Expert Group on Technology Transfer (EGTT) as an advisory body to the Subsidiary Body for Scientific and Technological Advice (SBSTA). Whether the “body” oversees the technology fund, regulates technology credit markets, and/or assesses the measurable, reportable and verifiable technology commitments by developed countries, would be the issues of particular interest.

Technologies that are required to be developed and transferred to countries such as Bangladesh for fighting climate change are:

- Agricultural technology
- Health technology
- Industrial design for low-carbon, high energy-efficient technology
- Renewable energy resources/ technology
- Financial resources for adaptation to natural disasters (infrastructure development)
- Research and development in the fields such as, new varieties of tolerant crops, and new sources of renewable energy

#### **5.4 Climate Change and Trade**

The Stern Review (2007) has described climate change as the greatest market failure the world has ever seen. Thus, trade has an important place in the globalisation process as well as climate change mitigation and adaptation. The Bali Roadmap recognises the importance of “opportunities for using markets to enhance cost-effectiveness of, and to promote, mitigation actions.” Trade has implications for the five elements and vice-versa. Trade is an important channel for the diffusion of goods to mitigate climate change. Lowering trade barriers brings their prices closer to world market prices, making them more affordable to consumers (industry and households), thereby reducing climate mitigation costs overall. Trade encourages the spread of technological innovations that are beneficial in mitigating climate change. Lowering tariffs on climate mitigation goods can also contribute to UNFCCC technology transfer mandates by facilitating access to these goods.

Countries are pursuing trade liberalisation at unilateral, bilateral, regional and multilateral levels with vigour. It has now been realised that international trade measures and policies intersect with climate change, and hence trade negotiations and climate change negotiations cannot take place in isolation for a meaningful outcome. Thus, international trade regulations and ongoing negotiations at the WTO could possibly cut across climate negotiations, giving rise to another debate. Issues such as carbon emission reduction, border measures and cross-border carbon trading would be put on the table. When it has become necessary to draw a conclusion on negotiation on reduction or elimination of tariffs and non-tariff barriers (NTBs) for environmental goods and services, these issues also



coincide with the Copenhagen negotiation. Liberalizing trade also holds the implications for cost of mitigation measures, particularly for those technologies with face high NTBs.

Due to its extreme vulnerability to climate change as well as its growing participation in global trade, Bangladesh should be alert of the inter-linkages between trade and climate change. The Marrakesh Agreement establishing the WTO in 1994, envisions trade as a means to some goals, including raising standards of living, optimal use of the world's resources in accordance with the objective of sustainable development, and protection and preservation of the environment. And according to the guiding principles for the UNFCCC, set forth in 1992, measures taken to combat climate change should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.

Bangladesh is yet to have a position on the relationship between trade and climate change, and the ways trade can be used to fight climate change. There is thus a need to contribute to the global debate on: (i) how trade policy tools such as tariffs and para-tariffs, subsidies, quotas, standards and labeling affect climate change; (ii) how trade can assist in addressing climate change; (iii) whether climate change measures violate world trade rules or affect trade patterns; and (iv) how the trade rules can/should be amended/interpreted for the realisation of climate change as well as sustainable development goals.

Before Bangladesh enters any deals, issues such as definition of the environmental goods and services, classification and description of harmonised system across countries, changes in technology, tariff measures, access to technology and issues related to perceived impacts on domestic industries must be examined carefully. At the same time it has to be aware of any trade protectionist measure in the name of environmental improvements. The US, Canada and the European Union (EU) have made proposals to "level the playing field" by using carbon tariffs, that is duties imposed on imports from countries having less control on greenhouse gas emissions. The US House of Representatives on 26 June 2009 passed a bill including the use of carbon tariffs, raising concerns among developing countries including China and India that developed nations were resorting to a new weapon of trade protectionism. To some such proposals would "license developed countries to resort to trade protectionism in the name of protecting the environment." Both the EU and the US attempt to impose additional "carbon tariffs" on exports of goods that are produced in the energy-intensive and carbon-intensive industries of steel, aluminum, cement and fertiliser. Under a cap and trade system, polluters of the developed world will be issued generous allowances, and if they have excess quota they can trade it for cash. The legislation is likely to give the US polluters far more quota than they need, which they can then sell to American distributors of imported goods, with the proceeds being used to upgrade old greenhouse gas spewing plants. Developing nations disagree with this issue and argue that protectionism in this way is an impediment to their economic growth. Against the US "leveling the playing field" theory, most developing countries argue that they are already starting with a very "unlevel" playing field. Moreover, the protectionism policy will impede the trade development of these countries. This protectionism policy is a form of reiterated barriers to trade such as technical barriers to trade (TBT) and sanitary and phytosanitary (SPS). Bangladesh should also be watchful against green protectionism by the developed countries and demand for greater help to deal with their eco-problems.

## **6. CONCLUDING REMARKS**

Being one of the most affected and vulnerable countries in the world due to climate change Bangladesh is certainly well-positioned to raise its voice and bargain for getting a fair share in a global climate deal. The pre-requisites for these include adequate knowledge to present the right issues and reasons clearly and loudly. The negotiators have to have a clear understanding of the depth and extent of the problem in terms of its impact on various sectors of the economy both in physical and economic terms. Arguments should be backed by scientific and empirical evidences which establish the link between climate change and economic, social, cultural and ecological damage in the country. In order to make her case stronger Bangladesh can refer to not only the negative impacts of climate change but also various initiatives taken by the country towards dealing the climate change including allocation of to her own initiatives for developing a climate fund in the country.

The need for strong international lobbying, possible diplomatic tie-ups and relationship with the powerful economies, and creating pressure groups with various groups such as “most vulnerable countries,” “other affected countries,” “developing countries,” and “South Asian Bloc” will be useful to achieve positive results. Given the fact that climate change is a complicated and technical issue, there is a need for including experts, representatives from NGOs, CSOs and all stakeholders to tackle the problem domestically, and to devise a position for negotiation at the international levels.

The GoB aims to eradicate poverty and achieve economic and social well-being for the people at all levels. This could be achieved through a pro-poor, climate resilient and low-carbon development strategy, based on the four building blocks of the Bali Action Plan – adaptation to climate change; mitigation; technology transfer; and adequate and timely flow of funds for investment – within a framework of food, energy, water and livelihoods security.

## REFERENCES

ADB. 1994. *Climate Change in Asia: Bangladesh Country Report*. Manila: Asian Development Bank (ADB).

Agrawala, S., Ota, T., Ahmed, A.U., Smith, J. and Aalst, M.V. 2003. *Development and Climate Change in Bangladesh: Focus on Coastal Flooding and the Sundarbans*. Paris: Environment Directorate, Organisation for Economic Co-operation and Development (OECD). <http://www.oecd.org/dataoecd/46/55/21055658.pdf>

BBS. 2009. *Preliminary Report of the Agricultural Census 2008*. Dhaka: Bangladesh Bureau of Statistics (BBS), Ministry of Planning, Government of Bangladesh (GoB).

BCAS-RA-Approtech. 1994. *Vulnerability of Bangladesh to Climate Change and Sea-level Rise: Concepts and Tools for Calculating Risk in Integrated Coastal Zone Management*. Dhaka: Bangladesh Centre for Advanced Studies (BCAS), Resource Analysis (RA) and Approtech Consultants Ltd.

Behrens, A. 2008. *Financial Impacts of Climate Change: What Scale of Resources is Required?* Brussels: Centre for European Policy Studies (CEPS). Paper presented at COP14/CMP4, of the Mistra/CEPS side event "The New Finance Architecture for Post-2012," 4 December, Poznań. <http://aei.pitt.edu/11450/01/1743.pdf>

Bhatt, M.S. and Islam, A.K.M.N. 2008. "Biocultural Diversity in India: Prospects and Challenges." *Journal of Environmental Economics*, 6 (3).

BUP-CEARS-CRU. 1994. *Bangladesh: Greenhouse Effect and Climate Change*. Dhaka: Bangladesh Unnayan Parishad (BUP), Centre for Environmental and Resource Studies (CEARS), University of Waikato, New Zealand and Climate Research Unit (CRU), University of East Anglia, UK.

Deb, U.K., Khaled, N., Al Amin, M. and Nabi, A. 2009. *Climate Change and Rice Production in Bangladesh: Implications for R&D Strategy*. Paper presented at the Special Conference on "Climate Change and Bangladesh Development Strategy: Domestic Tasks and International Cooperation," organised by Bangladesh Paribesh Andolan (BAPA) and Bangladesh Environment Network (BEN), 2 January, Dhaka.

European Commission. 2007. *Limiting Global Climate Change to 2 degrees Celsius: The Way Ahead for 2020 and Beyond*. [http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2\\_007\\_0002en01.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2_007_0002en01.pdf)

GoB. 2008. *Bangladesh Climate Change Strategy and Action Plan 2008*. Dhaka: Ministry of Environment and Forests, Government of Bangladesh (GoB).

IMF. 2008. *World Economic and Financial Surveys, World Economic Outlook Database*, April 2008 Edition. <http://www.imf.org/external/pubs/ft/weo/2008/01/weodata/index.aspx>

IPCC. 2001. *Climate Change 2001: Synthesis Report*. Geneva: Intergovernmental Panel on Climate Change (IPCC). [http://www.grida.no/publications/other/ipcc\\_tar/](http://www.grida.no/publications/other/ipcc_tar/)

----. 2007. *Climate Change 2007: Synthesis Report*. Geneva: Intergovernmental Panel on Climate Change (IPCC). [http://www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_synthesis\\_report.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm)

Islam, A.K.M.N. 2008. *SIDR Cyclone in Bangladesh*. [http://siteresources.worldbank.org/CMU/DLP/Resources/KM\\_Nazrul\\_Islam.pdf](http://siteresources.worldbank.org/CMU/DLP/Resources/KM_Nazrul_Islam.pdf)

OECD. 2008. *OECD Environmental Outlook to 2030*. Paris: Organisation for Economic Co-operation (OECD).

Stern, N. 2007. *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press.

----. 2008. *Key Element of a Global Deal on Climate Change*. London: London School of Economics (LSE). [http://www.occ.gov.uk/activities/stern\\_papers/Key%20Elements%20of%20a%20Global%20Deal%20-Final01may.pdf](http://www.occ.gov.uk/activities/stern_papers/Key%20Elements%20of%20a%20Global%20Deal%20-Final01may.pdf)

UNDP. 2007. *Human Development Report 2007-2008*. New York: United Nations Development Programme (UNDP).

UNEP/GRID-Arendal. 1999. *Projection of Global Average Temperatures*. [http://maps.grida.no/go/graphic/projection\\_of\\_global\\_average\\_temperatures](http://maps.grida.no/go/graphic/projection_of_global_average_temperatures)

UNEP/GRID-Arendal. *Potential Impact of Sea Level Rise on Bangladesh*. <http://maps.grida.no/go/graphic/potential-impact-of-sea-level-rise-on-bangladesh>

UNEP/GRID-Arendal. *Trends in Natural Disasters*. <http://maps.grida.no/go/graphic/trends-in-natural-disasters>

UNFCCC. 2007. *Report of the Conference of the Parties on its Thirteenth Session, held in Bali on 3-15 December 2007*. Germany: United Nations Framework Convention on Climate Change (UNFCCC). [http://unfccc.int/meetings/cop\\_15/conference\\_documents](http://unfccc.int/meetings/cop_15/conference_documents)

Vattenfall. 2007. *Vattenfall's Global Climate Impact Abatement Map*. [www.vattenfall.com/climate](http://www.vattenfall.com/climate)