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Policy brief: Climate change and implications for Bangladesh - Input to discussion on Swedish cooperation strategy with Bangladesh

The Policy brief was written in March, 2006, at the request of Sida's Asia department (att: Jan Essner) and INEC (att: Miriam Palm) by Olof Drakenberg and Daniel Slunge at the Environmental Economics Unit (EEU), Department of Economics, Göteborg University as part of Sida-EEU's institutional collaboration on environmental economics and strategic environmental assessment. This policy brief gives a background to the implications of climate change for Bangladesh and points at possible implications for Swedish cooperation strategy with Bangladesh.

Coping with climatic events like drought, cyclones and flooding are not new to Bangladesh. There has been an important reduction in the number of deaths from cyclones due to the establishment of efficient early warning systems and the construction of cyclone shelters. The impacts of climate change are anticipated to exacerbate these existing stresses and constitute a serious impediment to poverty reduction and economic development. Given that Bangladesh has relatively low emissions of green house gases, the major effort will focus on adaptation measures to cope with increased flooding, salinity intrusion and falling agricultural yields.

Sida's position on climate change

Below some excerpts from Sida's position paper on climate change

- The main priority is to prevent and minimise emissions of greenhouse gases. Another need is to strengthen people's capacity to adjust to climate change.
- For example, activities relating to energy, transport and private sector development will mainly focus on limiting emissions of greenhouse gases, Sida's work on health and water resources will have its main focus on counteracting the consequences of climate change. Where agriculture and forestry are concerned Sida's work will focus on reducing emissions and vulnerability..
- Responsibility for matters relating to climate change shall be spread throughout the organisation in a way that facilitates the into Sida's activities

About climate change

During the 20th century the average temperature has risen by 0.8°C over land and 0.5°C at sea. It is widely agreed by the scientific community that human activities are altering our climate system and that the temperature will continue to rise. The United Nations Intergovernmental Panel on Climate Change (IPCC) forecasts the following impacts due to climate change:

- extreme weather events such as droughts, storms and floods are likely to increase both in frequency and magnitude
- increased level of flooding, accelerated erosion, loss of wetland and mangroves and seawater intrusion in freshwater reserves in many coastal areas

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-the number of people living in areas that are water stressed is projected to increase to several billions by 2050

Impacts of climate change will affect developing nations most and climate change is a serious threat to poverty eradication¹. This is explained by geographical and climatic conditions in many developing countries but also on their higher dependence on natural resources and limited capacity to adapt to the changes.

Human induced climate change is mainly caused by use of fossil fuels (oil, natural gas and coal), deforestation and emissions of methane from livestock, agriculture and waste dumps.

The costs of climate change are difficult to estimate. A UNEP funded study (2002)² estimated global costs in the order of 150 billion USD per year due to more severe storms and cyclones. In 2005 the insurance companies incurred costs for natural disasters (earthquakes, flooding, hurricanes etc) amounting to 200 Billion USD³. With climate change the number of environmental refugees could be as many as 200 million people.⁴

International conventions on climate change

The government of Bangladesh signed the United Nations Convention on Climate Change in 1992. In 2005 more than 155 states had ratified an addition to the treaty, the Kyoto protocol, which has legally binding measures to reduce emissions for richer countries. The Kyoto protocol also includes the establishment of a number of mechanisms that facilitate the transfer of technologies with low emissions to developing countries. Furthermore, the Protocol supports capacity development, adaptation funds etc in developing countries. The emissions targets set for the countries ratifying the protocol are low and even if the signatories of the Kyoto protocol should reach their reduction targets, global carbon dioxide emissions are expected to increase significantly due to larger emissions from countries such as the US, China and India.

As party to the convention on climate change, Bangladesh completed a National Adaptation Programme of Action (NAPA) in 2005. It includes extensive background information, scenarios and recommended actions.

Climate change and Bangladesh

The country's vulnerability to climate change is extreme and the IPCC impact assessment from 2001 identifies Bangladesh as one of the countries most susceptible to climate change.

Major impacts that threaten development and poverty reduction targets are:

- increased frequency of storms, cyclones and tidal surges
- salinity intrusion, drought and floods leading to significantly reduced agricultural yields and food insecurity

Bangladesh is one of the largest deltas of the world and is extremely susceptible to rises in sea level. Eighty per cent of the land area is categorised as floodplain and all land types except highlands are exposed to monsoon flooding for part or whole of the year. Seventy per cent of the population live in the inland plains and 15 % in the coastal plain. Cyclones and storms frequently hit Bangladesh and extreme flooding cause major losses of human lives. In 1998 the flooding made 30 million people homeless. Already, many poor people have lost their livelihoods as their lands have been permanently submerged. Bangladesh is highly dependent on agriculture that generates two-thirds of total

¹ AfDB, ADB et al (2003)

² Innovest (2002)

³ Munich Re (2006)

⁴ Myers (2005)

employment, a quarter of total export earnings and provides food security to the increasing population.⁵ Bangladesh depends on freshwater flows from rivers shared with other nations, particularly India. Co-operation around international freshwater flows will become even more important due to climate change.⁶

Yields from the agricultural sector are forecasted to be significantly reduced almost every year. Extreme scenarios indicate that rice production will fall by 30 %, wheat 50% and potato 70 %.⁷ The most damaging effects of climate change are floods, salinity intrusion and droughts⁸. Studies indicate that the coastal zone will be most vulnerable to impacts from climate change. Salinity intrusion with different sea level rise has been modelled under which the salinity front would move 60 km north in about 100 years.⁹

Adaptation to climate change in Bangladesh

The NAPA includes a list of prioritized activities on how to respond to the challenges from climate change. The programme has been developed through participation of key ministries, the scientific community, NGO and CBO representatives with the minister of Environment and Forests as secretary.

Top priority was given to:

Activity	Lead agency
1. Reduction of climate change hazards through coastal afforestation with community participation	Forest Department
2. Providing drinking water to coastal communities to combat enhanced salinity due to sea level rise	Department of Public Health
3. Capacity building for integrating climate change in planning, designing of infrastructure, conflict management and land water zoning for water management institutions	Water Resource Planning Organization
4. Climate change and adaptation information dissemination to vulnerable community for emergency preparedness measures and awareness raising on enhanced climatic disasters	Ministry of Environment and Forest
5. Construction of flood shelter and information and assistance centre to cope with recurrent floods in major floodplains	Disaster Management Bureau

Annex 1 contains the full list of recommended adaptation activities. It also includes two other tables from the NAPA; a) the causes of impacts, vulnerable areas and impacted sectors and b) intensity of impacts on different sectors due to climate change.

The Poverty Reduction Strategy Paper and climate change

As climate change will exacerbate existing problems in Bangladesh, rather than add new ones, it is unclear as to what extent climate change has impacted on the government's priorities. The PRSP "Unlocking the potential" include relatively few references to climate change *per se*. The executive summary includes a list of four priority areas for accelerating pro-poor growth. One of them is "rural electrification, roads, water supply and sanitation and supportive infrastructure including measures to reduce natural and human induced shocks".

Recommended actions in the NAPA are aligned with the PRSP in terms of efforts to increase the forest cover, to invest in water, sanitation and agriculture and to mainstream climate change into disaster management procedures as a cross cutting issue.

⁵ Government of Bangladesh (2005)

⁶ OECD DAC (2005)

⁷ Based on a scenario with 4°C temperature rise. National Adaptation Programme of Action (2005)

⁸ National Adaptation Programme of Action (2005)

⁹ National Adaptation Programme of Action (2005)

Climate change and implications for Sida in selected sectors

Given the importance of adaptation to climate change Sida could take the opportunity to raise adaptation as a dialogue issue with the government on a general level. Follow up of the PRS would be the central theme.

Points for discussion

- Are priorities related to climate change adaptation in the PRSP translated into medium term expenditure frameworks and budgets?
- Could better performance indicators improve implementation of the highly prioritized, participatory community based afforestation programmes?
- How could Sweden support Bangladesh in advocating for reduction of global emission levels of CO₂?

Health sector

Climate change is expected to impact on human health due to:

- degraded water quality and shortage that increase the likelihood of cholera, dysentery, malaria etc.
- reduced agricultural yields that aggravate the widespread malnutrition
- cyclones and flooding that increase losses of lives and livelihoods especially for the poor

The above will put additional pressure on the health sector. The health infrastructure is relatively poor due to low public spending. The Government of Bangladesh spends significantly less on health (US\$12 per person per year) than low income countries in general (US\$21).¹⁰

Prioritized adaptation measures in the NAPA:

-Providing drinking water to coastal communities to combat enhanced salinity due to sea level rise (Department of public health)

Health: Points for discussion

- How could the health sector be better prepared for extreme weather and natural disasters?
- Could more data on the burden of disease related to climate change be used to highlight the need for preventive action/adaptation? What role could the health sector play in raising awareness of the benefits of adaptation?
- Are recommended activities (NAPA) turned into action?
- What would it mean for the health sector to mainstream climate change issues in their work?

Infrastructure

Increased erosion and accretion (an increase of land by the deposit of waterborne sediment), inundation and cyclones are expected to have the greatest impact and cause damage on infrastructure. Furthermore, investment in infrastructure, roads etc, can in itself aggravate the problem with water logging by reducing the natural drainage capacity. The coastal zone is most prone to suffer from such problems.

Prioritized adaptation measures in the NAPA include:

-Capacity building for integrating climate change in planning, designing of infrastructure, conflict management and land water zoning for water management institutions (Water Resource Planning Organization)

-Construction of flood shelter and information and assistance centre to cope with recurrent floods in major floodplains (Disaster Management Bureau)

Infrastructure: Points for discussion:

¹⁰ NAPA

- Are aspects related to climate change integrated in Environmental Impact Assessments conducted for infrastructure investments? Are climate change issues analyzed and recommendations followed?
- Are climate change aspects mainstreamed into planning?
- What would it mean for the infrastructure sector to mainstream climate change issues in their work?
- Are recommended activities (NAPA) turned into action?

Education

Climate change adds to the existing needs of improved knowledge to improve agricultural yields. Increased knowledge about climate change also features among the top ten priorities in the NAPA. New curricula are to be developed to ensure that the future generations learn about climate change impacts and adaptation.

Prioritized adaptation measures in the NAPA include:

- Inclusion of climate change issues in curriculum at secondary and tertiary educational institutions.
- Promotion of research on drought, flood and saline tolerant varieties of crop to facilitate adaptation

Education: Points for discussion

- Are recommended activities (NAPA) turned into action?
- What would it mean for the educational sector to mainstream climate change issues in their work?

References

Government of Bangladesh *National Adaptation Programme for Action* 2005

Government of Bangladesh *Unlocking the potential - national strategy for accelerated poverty reduction* 2005

Interagency paper AfDB, AsDB, OECD etc *Poverty and climate change – reducing the vulnerability of the poor* 2003

IPCC *Climate change 2001, Impacts, adaptation and vulnerability* 2001

Innovest *Climate change and the financial services industry* 2002

Munich Re *Annual review natural catastrophes* 2006

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OECD DAC *Development and climate change in Bangladesh, focus on coastal flooding and the Sundarbans*, 2003

OECD DAC *Bridge over troubled waters – Linking climate change and development*, 2005

Annex 1

Table 1 Causes of impacts, vulnerable areas and impacted sectors

Climate and Related Elements	Critical Vulnerable Areas	Most Impacted Sectors
Temperature rise and drought	<ul style="list-style-type: none"> • North-west 	<ul style="list-style-type: none"> • Agriculture (crop, livestock, fisheries) • Water • Energy • Health
Sea Level Rise and Salinity Intrusion	<ul style="list-style-type: none"> • Coastal Area • Island 	<ul style="list-style-type: none"> • Agriculture (crop, fisheries, livestock) • Water (water logging, drinking water, urban) • Human settlement • Energy • Health
Floods	<ul style="list-style-type: none"> • Central Region • North East Region • Char land 	<ul style="list-style-type: none"> • Agriculture (crop, fisheries, livestock) • Water (urban, industry) • Infrastructure • Human settlement • Health • Disaster • Energy
Cyclone and Storm Surge ¹	<ul style="list-style-type: none"> • Coastal and Marine Zone 	<ul style="list-style-type: none"> • Marine Fishing • Infrastructure • Human settlement • Life and property
Drainage congestion	<ul style="list-style-type: none"> • Coastal Area • Urban • South West 	<ul style="list-style-type: none"> • Water (Navigation) • Agriculture (crop)

Source: NAPA Team

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

Source: NAPA Team

Table 2 Intensity of impacts on different sectors due to climate change

Table 10. The Final List of the Projects

Sl. No.	Project Title	Type of Project	Primary Implementing Agency	Total Cost
1	Reduction of climate change hazards through Coastal afforestation with community participation.	Intervention	Forest Department (FD)	Full project: USD 23 million Project design: 100,000
2	Providing drinking water to coastal communities to combat enhanced salinity due to sea level rise.	Intervention	Department of Public Health Engineering (DPHE)	Full project: USD1.5 million Project design: USD 25,000
3	Capacity building for integrating Climate Change in planning, designing of infrastructure, conflict management and land-water zoning for water management institutions.	Capacity building	Water Resource Planning Organization (WARPO)	USD2.0 million Project design: USD 25,000
4	Climate change and adaptation information dissemination to vulnerable community for emergency preparedness measures and awareness raising on enhanced climatic disasters.	Awareness and Capacity Building	Ministry of Environment and Forest (MoEF)	Full project: USD7 million Project design: USD 50,000
5	Construction of flood shelter, and information and assistance centre to cope with enhanced recurrent floods in major floodplains.	Intervention	Disaster Management Bureau (DMB) and Local Government Engineering Department (LGED)	Full project: USD5 million Project design: USD: 50,000
6	Mainstreaming adaptation to climate change into policies and programmes in different sectors (focusing on disaster management, water, agriculture, health and industry).	Capacity building	Department of Environment (DOE)	Full project: USD 1 million Design phase: USD 25,000
7	Inclusion of climate change issues in curriculum at secondary and tertiary educational institution.	Awareness raising	Board of Education	Full Project: USD 0.5 million Project design: USD 25,000
8	Enhancing resilience of urban infrastructure and industries to impacts of climate change	Capacity building	Department of Environment (DOE)	Full project: USD 2 million Design phase: USD 25,000

Table 3. The Final List of the Projects
Source: NAPA

Sl. No.	Project Title	Type of Project	Primary Implementing Agency	Total Cost
9	Development of eco-specific adaptive knowledge (including indigenous knowledge) on adaptation to climate variability to enhance adaptive capacity for future climate change.	Intervention	NGO consortium	Full project: USD 5 million Design phase: USD 50,000
10	Promotion of research on drought, flood and saline tolerant varieties of crops to facilitate adaptation in future.	Research	B a n g l a d e s h Agricultural Research Council (BARC)	Full project: USD 5 million Design phase: USD 50,000
11	Promoting adaptation to coastal crop agriculture to combat increased salinity.	Intervention	B a n g l a d e s h Agricultural Research Institute (BARI)	Full Project: USD:6.5 million Project design: USD 50,000
12	Adaptation to agriculture systems in areas prone to enhanced flash flooding-North East and Central Region.	Intervention	B a n g l a d e s h Agricultural Research Institute (BARI)	Full project: USD6.5 million Project design: USD 50,000
13	Adaptation to fisheries in areas prone to enhanced flooding in North East and Central Region through adaptive and diversified fish culture practices.	Intervention	Department of Fisheries (DOF)	Full Project: USD4.5 million Project design: USD 50,000
14	Promoting adaptation to coastal fisheries through culture of salt tolerant fish special in coastal areas of Bangladesh	Intervention	Department of Fisheries (DoF)	Full project: USD 4 million Project design: USD 50,000
15	Exploring options for insurance to cope with enhanced climatic disasters.	Research	Department of Environment (DOE)	Full Project: USD0.2 million Project design: USD 25,000

Table 3. Continued The Final List of the Projects
Source: NAPA