CLIMATE CHANGE CELL

KEY FACTS

Climate Variability and Change in Bangladesh

Impacts, Vulnerability and Risks

The global climate is changing and it is likely to change further over coming decades due to increasing concentrations of 'greenhouse gases' in the earth's atmosphere caused largely by human activities. This will result in greater variations in weather patterns, a greater frequency of extreme weather events such as floods, droughts and tropical storms, and gradual rises in average temperatures and sea-levels.

Bangladesh is extremely vulnerable to climate change impacts because of its geographical location, high population density, high levels of poverty, and the reliance of many livelihoods on climate-sensitive sectors, particularly rural agriculture and fisheries. These impacts will be falling more heavily on the women and girls of Bangladesh.

Climate change therefore threatens both previous achievements and future efforts to reduce poverty in Bangladesh to date, particularly by reducing water and food security and damage to essential infrastructure during more frequent disaster events.

Bangladesh has always been vulnerable to climate variability. This is due to its geographical features and location, high influence of monsoon and regional flow patterns, *too much water in monsoon* and *too little water in the dry season*, etc. These have significant effects on the socio-economic realities, i.e. population density, inequity and deprivation, poverty and per capita resource endowment, and development practices. **The overall impacts on Bangladesh already are and will be significant since climate variability and change will significantly affect the hydrology.** The location of the country in the regional setting is in itself an element of vulnerability by giving rise to climate extremes. Further, the regional aspects of water management put additional difficulty toward adaptation to climate change and climate variability.

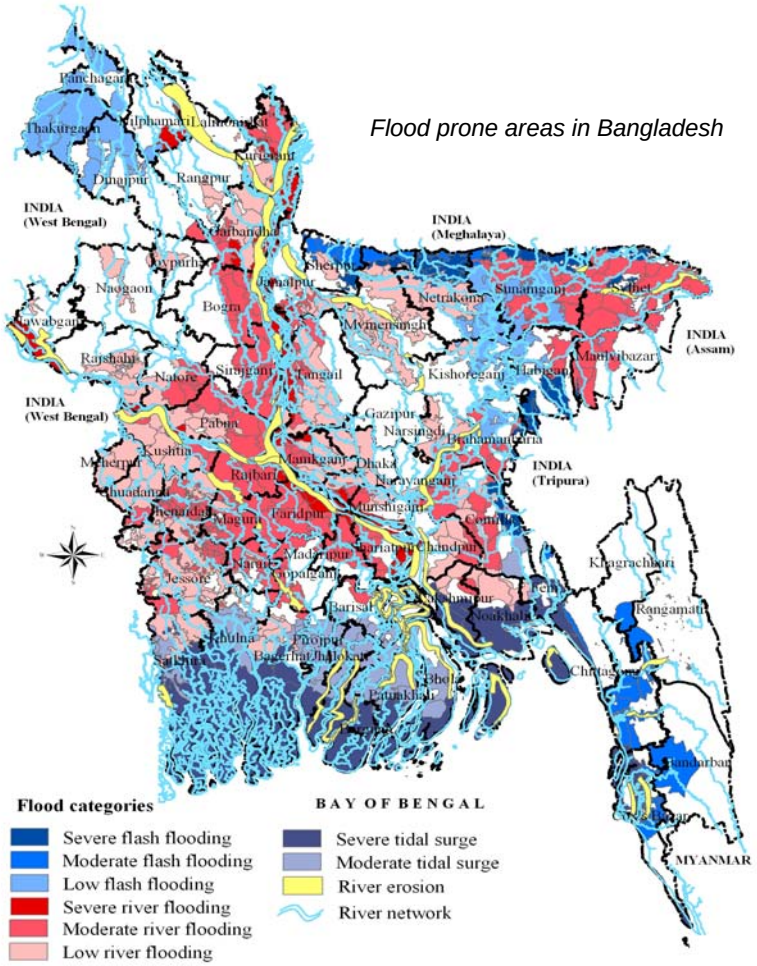
Too much water during monsoon

The climate of the country is strongly influenced by monsoon. Though Bangladesh occupies only 7% of the combined catchment area of the *Ganges-Brahmaputra-Meghna* river basin, the country has to drain out 92% of the flow into the Bay of Bengal.

Too much water in the monsoon period affects different sectors, livelihoods and food security. Climate change scenario projections show mean monthly rainfall may significantly change over normal (i.e. current variability). Monsoon rainfall may increase by 11% by 2030 and 27% by 2070. Also, the general rise in surface average temperature will increase by 1.3 degree C by 2030 and 2.6 degree C by 2070. The number of rainy days will increase by about 20 days.

Implication of these climate change scenarios is that about 18 percent of current lowly flooded areas will be susceptible to higher levels of flooding while 12 to 16 percent new areas will be at risk to inundation. On an average about a quarter of the country's landmass is currently flood prone in a normal hydrological year, which may increase to 39 percent, while the frequency of a catastrophic flood (affecting over two-third of the landmass of the country) could increase under climate change scenarios. Prolonged flooding can effectively reduce overall potential for HYV *Aman* production.

Flood prone areas in Bangladesh



Too little water during the dry season

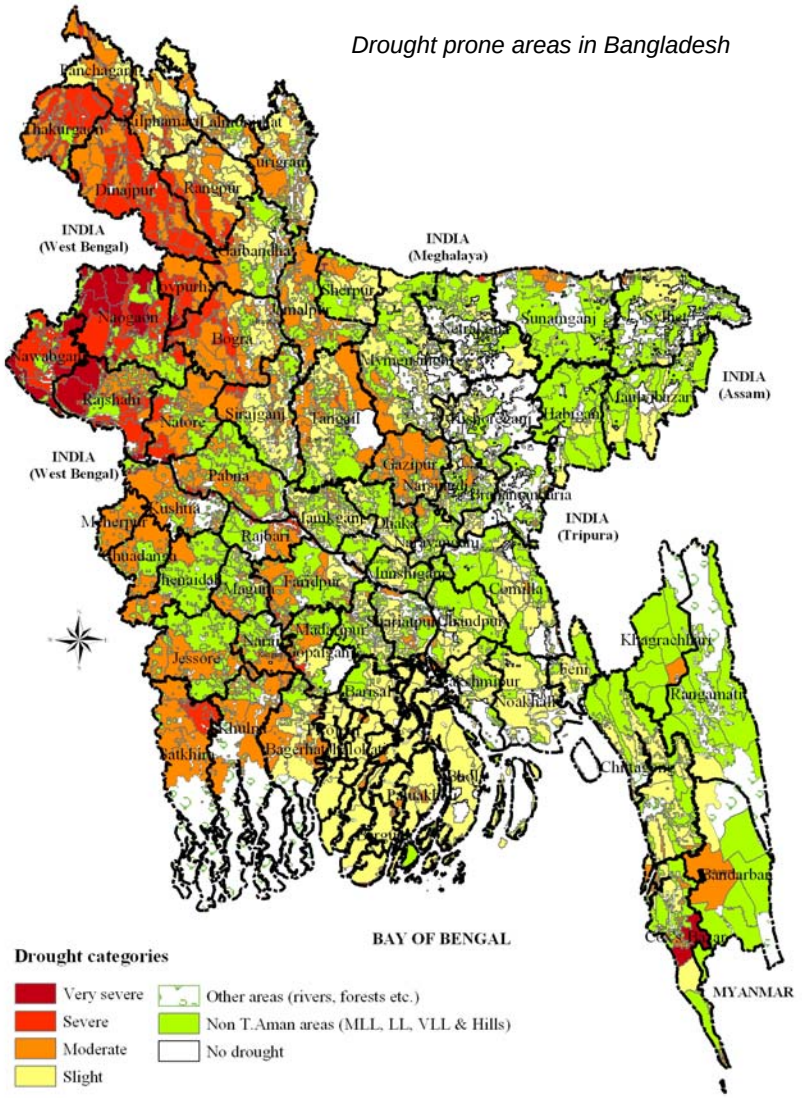
During the post-monsoon to pre-monsoon cycle, rainfall diminishes while temperature increases. Low rainfall runoff reduces river flows, consequently salinity penetrates along the coastal rivers. A combination of increased temperature and reduced rainfall results in an increase in evapo-transpiration, detrimental to crop growth.

Under climate change scenario projections, already low rainfall in the dry season will be further diminished. However, winter and pre-monsoon temperatures will rise significantly.

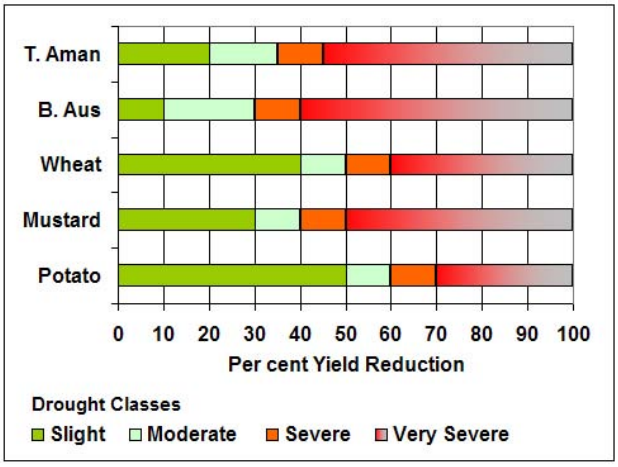
The following consequences are possible:
A sharp rise in evapo-transpiration and diminishing rainfall will further reduce available flows in rivers. As a result, salinity will penetrate inland, restricting choice for the most preferred crops. Also, the lowering of rainfall runoff will either limit irrigation or put increased economic constraints on the already poor farmer.
Production of wheat, HYV *Aus* and *Boro* might no longer be economically suitable under climate change. Increased surface temperature will lead to release of more carbon from the topsoil, which in turn will reduce fertility of soils.

Increased water demand for irrigation will lead to increased withdrawal from the already lean surface water systems leading to further decrease in lean season flow in the rivers. An additional quarter of a million hectare land will become affected by salinity, on top of the 3.05 million hectares already affected. This will force farmers to grow crops of economically lesser returns.

Drought prone areas in Bangladesh



Impact of drought on agriculture and crop production



Implication for the Sunderbans and biodiversity

Lean flow in the distributaries of Ganges will jeopardize the forest succession processes in the Sunderbans, resulting in low productivity and poor vegetative cover of the forest. This will in turn affect the rich biodiversity of the forest.

Implication for human health

High salinity in water, in both surface and groundwater sources in the southwestern areas of Bangladesh is affecting human health. What will happen if salinity penetrates further inland under climate change? The rise in temperature will favor pest and pathogen activities and human health will be at higher risk, i.e. increased risk of dengue, malaria, diarrhea, etc.

Recurring floods will tend to destroy poor sanitation infrastructure and facilities. Cyclones with increased vigor will also have similar effects. Reaching the MDG targets will be extremely difficult under climate change conditions.

Sea Level Rise

The projected sea level rise (SLR) along the coastal areas of Bangladesh will be about 88 cm by the year 2100. If this comes true, a majority of the low-lying non-embanked coastal areas may be completely inundated. There will be increasing risk of coastal salinity (both soil as well as surface water, including drinking water from wells). Scarcity of saline free drinking water will be even more pronounced.

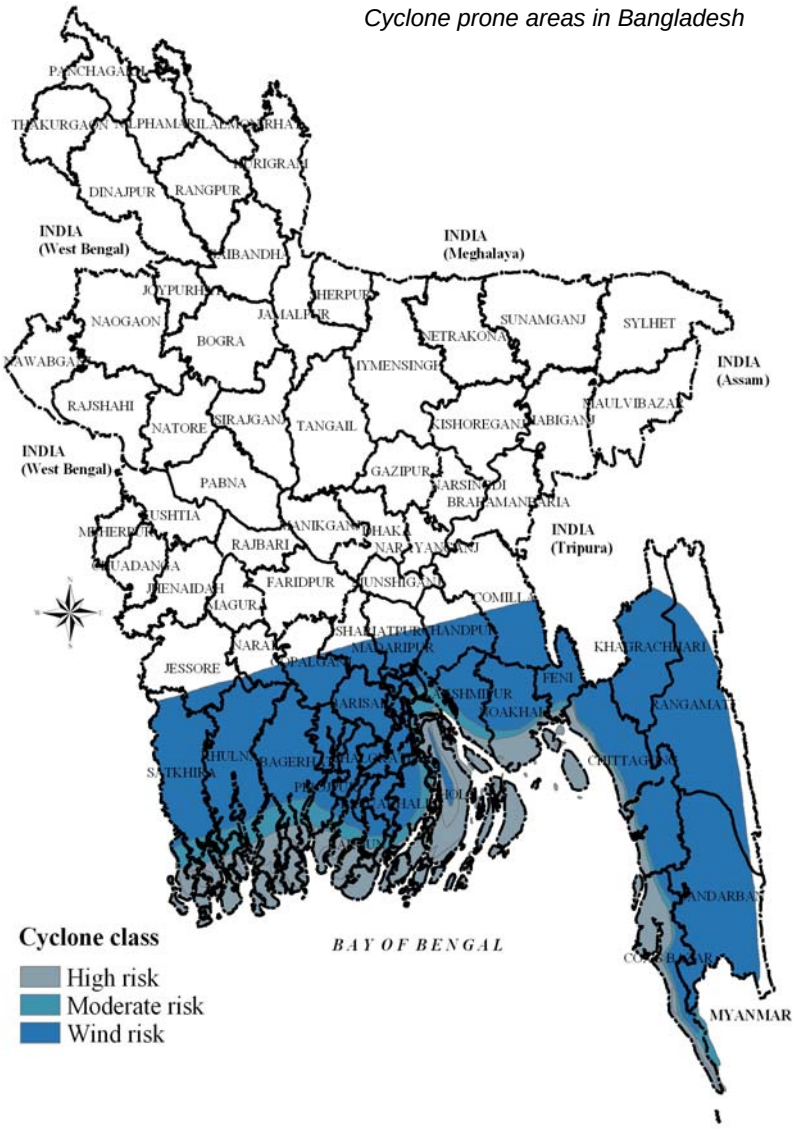
SLR will have compounding effects on coastal drainage and erosion. The mixing zone between fresh (sweet) water and saline water will also shift. Land use suitability, particularly in relation to current agricultural practices will change.

Embanked coastal agricultural areas will be at higher risk of tidal surge and subsequent inundation with saline water. SLR will cause shoreline retreat, resulting in increase in basin area, which contributes to increasing the cyclone path length. This will allow the cyclone to remain more time in the water, acquire and release more latent heat, resulting in more energy, intensity and wind speed.

Conclusion

In conclusion, water resources and hydrology of Bangladesh are highly sensitive to current climate variability. Within Bangladesh, climate variability has two major dimensions – temporal and spatial. Both are highly significant. There are various elements of vulnerability associated to current climate variability. Under climate change, observed climate variability will increase causing extreme climate conditions. Floods, droughts and salinity ingress will occur more frequently and with higher intensity.

Cyclone prone areas in Bangladesh



The country has to implement adaptation measures in order to reduce its current variability and change. In relation to the southwest region of Bangladesh, the implications as the maximum impact zone is higher salinity, choking up of small rivers, water logging, embankment breaching and overtopping, cyclonic storm surges, riverbank erosion. Agriculture will be severely affected. Upper reaches will face drought conditions. A major challenge will be to assure saline free drinking water to the population and ecosystem.

ABOUT CLIMATE CHANGE CELL

The Climate Change Cell has been established in the Department of Environment in 2004 under the Comprehensive Disaster Management Program (CDMP) of the Government. It responds to the recognition that Bangladesh is particularly vulnerable to the effects of climate change, and that the number and scale of climate-related disasters is likely to increase. The Cell provides the central focus for the Government's climate change related work, operating as a unit of the Department of Environment (DoE) under the Ministry of Environment and Forests (MoEF). Its objective is to enable the management of long term climate risks and uncertainties as an integral part of national development planning. This will contribute to the primary objective of the wider Comprehensive Disaster Management Programme, which aims to strengthen the capacity of the Bangladesh disaster management system to reduce unacceptable risks and improve response and recovery activities.

- Building the capacity of Government
- Strengthening existing knowledge and availability of information on impact prediction and adaptation to climate change.
- Awareness raising, advocacy and coordination with partners across government, NGOs, civil society, private and donor organizations.
- Improving capacity to adapt livelihoods to climate change in the agriculture sector

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PREPARING FOR CLIMATE CHANGE

CLIMATE CHANGE CELL

Department of Environment

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