Climate Change as if Development Mattered

A Perspective on Developing Bangladesh Strategy

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CHAPTER ONE
INTRODUCTION

The people of Bangladesh are experiencing and are at the receiving end of the adverse impacts of climate change, while awaiting a comprehensive strategy to mitigate its causes, to enable her to adapt to its effects, to mobilize financial resources, and to augment clean technology for sustainable development. Despite being the least contributor to the causation of climatic vulnerability, Bangladesh is one of worst victims, and is exposed to severe and frequent floods, tropical cyclones, storm surges and droughts.

Climate change is one of the single most critical threats faced by the human species for advancing progress and development. This is one of the greatest obstacles to ending poverty and realizing rights, threatening the strides made and journey to lifting people out of poverty, as the poor, particularly the women and marginalized sections are hit hard.

The historical responsibility for the vast majority of greenhouse gas emissions over the past 250 years lies with the industrialized countries of the North. Cheap energy – in the form of oil, coal and gas – has been the engine of their rapid industrialization and economic growth. Although the exploitation of fossil fuels has occurred across the planet, the benefits have largely accumulated in the North. Corporate-driven globalization further aggravates global warming due to the promotion of unsustainable production, the subordination of society and the environment to corporate profits, and the privatization of the commons and public goods and services.

Climate change reflects and reinforces inequalities, and poses a fundamental threat to development. The poor have done least to contribute to the problem and have the fewest means to respond, yet will also be most affected.

Against this backdrop, poverty alleviation, socio-economic development and environmental protection should constitute the overriding goals of sustainable development in Bangladesh. To meet these goals, Bangladesh needs rapid economic growth to fulfil the aspirations of the people, particularly to make a dent on poverty. But this growth should not occur at the expense of country's environment and should be speeded up with cleaner technology and alternative sources of energy to maintain the low-carbon growth path.

The environment has inherent linkages with climate. The earth's climate is a complex system, resulting from an aggregated interaction of many components such as the ocean, the atmosphere, human beings, and living organisms like forests and the bio-diversity. The earth's climate has changed over the millennium, but what is causing concern is the projected rapid rate of change in the earth's climate due to increased human activities like energy use, industrial processes, agriculture and land use, land use change and forestry.

Disproportionately impacting lives and livelihood

Given the spatial distribution of agro-ecological diversity in Bangladesh, the climate change is expected to have multi-faced effects on the nature and the people of Bangladesh**.** Temperature is likely to rise steadily all over Bangladesh accompanied with increasing rainfall in all seasons[1]. Together with likely temperature increase, current trend of shifting of temperate zone from the north-western region to western half of the country suggests frequent droughts would occur in western part of Bangladesh while excessive rainfall in all seasons coupled with drainage congestion would result in frequent flooding in the eastern zone of the country.
The country's cereal production is likely to face a considerable amount of reduction. An estimate[2] suggests that 1 million people would be directly affected due to sea-level rise by 2050.[3] In addition, the risk of cyclone has manifolded, as in the last couple of years the Bay of Bengal has been unusually rough. Waterlogging, salinity and river erosion problems have also been enhanced by climate change effects as documented by the scientific communities.

The climate change is disproportionately impacting lives and livelihood the world over, particularly in country like Bangladesh. The adverse effects of climate change, climate variability, sea-level rise and associated phenomena such as the increase in the intensity and frequency of hurricanes and other extreme weather events continue to threaten the sustainable development, livelihoods and existence of many coastal developing countries.

Geo-physical risks associated to climate variability and change are often location-specific, while vulnerability of people living there is generally a function of geo-physical elements of vulnerability and the contexts of vulnerability – the latter are often determined by interactions among people's well-being, access to various forms of assets and livelihoods.
The impacts on livelihood due to climate change depend on the nature and severity of the physical impacts relating to agriculture, water availability and quality, disaster-proneness, hospitability of the physical environment due to rising temperature and changing water regimes to pathogenic activity and coastal inundation.

Given these physical changes including sea level rise, the livelihood impacts may be felt in several ways, not necessarily in any given sequence although the final outcome is always a diminution in employment or employability, income and consumption. The impacts are felt in different degrees by different socio-economic groups. These mean a poorer Bangladesh compared to a situation without climate change and lower level of development. Climate change impacts on livelihood and thus become a challenge of development under adversarial dynamics of nature.

[1] Roy, K., Rahaman, M., Kumar, U. and Shaha, S.K., 2008. Implications of climate change and associated evapotranspiration on crop agriculture in the south-western part of Bangladesh: Scenario development using coupled MAGICC/SCENGEN-CROPWAT model. *Proceedings of the International Conference on Impacts of Global Climate Change.* 25-29 August 2008. Dhaka University, Ohio State University, FAO-WMR-ESCAP
[2] I.M. Faisal and S. Parveen, 'Food security in the face of climate change, population growth and resource constraints: implications for Bangladesh', *Environmental Management*, Volume 34,pp. 487-498, 2004.
[3] J.P. Ericson, C.J. Vorosmarty, S.L. Dingman, L.G.Ward and M.Meybeck, 'Effective sea-level rise and deltas: causes of change and human dimension implications', *Global Planet Change*, Volume 50, pp. 63-82, 2005.

Right to Development and Justice

Millions people living below the poverty line in under-developed country like Bangladesh are likely to be the worst victims of climate change with their limited capacity to deal with shocks and crises. Their rights can only be protected if we can frame the climate change debate in terms of: *distribution of impacts; distribution of responsibility; and distribution of costs and benefits*. Fundamental is to focus on right to development, equality, distributive injustice and corrective justice for historical emissions. This also requires greater grounding, with rigour to frame principles leading to burden sharing formulas, including ecological debt, equal rights per capita entitlements, as opposed to "grandfathering" rule. The claiming of rights is a matter of *justice*, not of advancing the ideas of begging bowls to rich countries, but to hold them accountable.

In fact climate injustice affects the poor, marginalized, particularly women, in terms of erosion of their right to live with dignity. The increasing urbanisation , resulting out of the rural, urban divide, the increasing inequality among the rich and poor in both rich and poor countries, and the lack of accountability of big corporations as well government contribute to environmental injustice as well as adverse consequences of climate change. The key issue is this: while those responsible for pollutions are often rich people and rich countries, those who are at the receiving end are poor people and poor countries.

Furthermore, the climate change undermines the hard-earned development gains of the last several decades and also threatens the sustainability of Bangladesh's achievement in terms of development. The climate change puts Bangladesh to find out a strategy a comprehensive strategy to mitigate its causes, to enable her to adapt to its effects, to mobilize financial resources, and to augment clean technology for sustainable development**.** Given the poverty dimension, economic growth, technological development and nation's capacity to adapt, climate change is therefore a development issue. A national response in this regard, must have to travel beyond the usual of disaster management, risk reduction, adaptation to climate variability and natural hazards. This has to be integrated into the national development strategy, with emphasis on right to development and justice, with people at the centre, and driven by, and centred on, livelihood. The fundamentals of the strategy should be:

- Right to development
- Right to economic, social and political self-determination
- Right to highest quality health and well-being
- Right to clean and healthful ecology
- Right over natural resource system
- Rights of indigenous peoples(Institutions , property , labour , cultures & environment)

The working paper aims to present a framework for development of national climate change strategy, with people and their livelihood at its core.

CHAPTER TWO
climate change and Livelihoods vulnerability: Building blocks of strategic framework

The development of a comprehensive strategy warrants an assessment of sectoral vulnerabilities. The main reasons for higher propensity of vulnerability of Bangladesh to climate change are attributed to the following:

- Location on a young delta where formation is not completed and featuring low flat topography;
- Positioned at the catchment area where 92 percent of the annual runoff are generated in the Ganges-Meghna-Bramhaputra (GMB) basin, comprising of seven percent of the total catchment[1];
- Extreme climatic variability in a smaller area which is governed by monsoon resulting in acute spatial and temporal water distribution;
- High poverty incidence, and high population density, ranking sixth in the world; and
- Majority of population dependent on crop agriculture and live within the coastal zone, the two most vulnerable sectors under climate change.

The impacts on livelihood due to climate change depend on the nature and severity of the physical impacts relating to agriculture, water availability and quality, disaster-proneness, hospitability of the physical environment due to rising temperature and changing water regimes to pathogenic activity and coastal inundation[2]. Given these geophysical changes including sea level rise, the livelihood impacts may be felt in several ways, not necessarily in any given sequence although the final outcome is always a diminution in employment or employability, income and consumption, although the impacts may be felt in different degrees by different socio-economic groups. These mean a poorer Bangladesh compared to a situation without climate change and lower level of development. Climate change impacts on livelihood thus become a challenge of development under most adversarial changes in dynamics of nature. The NAPA document identified and priotized 4 sectors of vulnerability, which are water resources, coastal zone resources, agriculture and human health in order of severity of vulnerability. **This document has followed the same priotised ladder of CC livelihoods vulnerability but addresses from the perspective of livelihoods.**

[1] J.M. Coleman, 'Brahmaputra River: Channel Processes and Sedimentation', *Sedimentary Geology*, 1969

[2] GOB, 2005. *National Adaptation Programme of Action (NAPA)*, Final report: November 2005, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh (GOB), Dhaka, 48 p.

Floods

Extensive floods particularly affect the poorest-of-the-poor hard as they lose whatever assets they have and also suffer from lack of work and wages. In fact people living in areas with regular flooding have low levels of health, nutrition and education. Floods also contribute to the concentration of landownership due to distress sale by the poor in the post-flood situation to the richer people in the community[3]. Therefore increasing floods due to climate change are likely to increase the incidence of poverty as well as threat the so-called "middle poor" or working class just above the poverty line becoming "ultra-poor"[4].

Severe floods like those of 1988 and 1998 are expected to occur after 50-100 years of intervals but environmental damage including climate change is thought to accentuate of occurrence more often. Such are expected to become even more common in the future due to global warming. The reduction in food production is another problem caused by floods. For example, the 1998 flood reduced agricultural production by 45%[5]. High-yielding *aman* rice varieties are easily destroyed by floods as they are unable to grow fast enough to keep up with the increasing depth of flood water and if the flood water rises faster than 4-5cm per day, other rice varieties also succumb. Monsoon vegetables also die if those go under water.[6] It also affects rural incomes, as agriculture still employs 70% of the population. Floods caused by heavy monsoon rain can contaminate drinking water with the cholera bacterium, while in droughts, the cholera bacteria can grow in the stagnating water in ponds and rivers.[7]

Droughts, agriculture and irrigation

The climate change is thought to increasing the frequencies of droughts, as only five devastating droughts occurred in the hundred years during the period of 1800-1900, yet since 1981, four major droughts have occurred in the last 25 years mostly in northwestern Bangladesh.[8] The area

[3] Chowdhury, A. 2002. *Disasters: Issues and Responses.* In: Bangladesh Environment: Facing the 21st Century. (2nd ed.) Ed. Gain, P. Dhaka : Society for Environment and Human Development (SHED). 217 –235.
[4] Pender, J.S. 2008. *What Is Climate Change? And How It Will Effect Bangladesh*. Briefing Paper. (3nd Draft). Rajshahi, Bangladesh : Church of Bangladesh Social Development Programme.
[5] Ahmed, A.U. 2006. *Bangladesh Climate Change Impacts and Vulnerability: A Synthesis*. Dhaka : Climate Change Cell, Bangladesh Department of Environment.
[6] Karim, Z., Hussain, S.K.G., & Ahmed, A.U. 1999. *Climate Change Vulnerability of Crop Agriculture.* In: Vulnerability and Adaptation to Climate Change for Bangladesh. Eds. Huq, S., Karim, Z., Asaduzzaman, M., & Mahtab. Dordrecht/Boston/London : Kluwer Academic Publishers. 39 – 54.
[7]Haq, N. 2005. *Climate change to increase cholera attacks*. The Daily Star. Dhaka : November 16, 2005.
[8] Selvaraju, R., Subbiah, A.R., Baas, S., & Juergens, I. 2006. *Livelihood adaptation to climate variability and change in drought prone areas of Bangladesh: Developing institutions and options*. Asian Disaster Preparedness Centre, Food And Agriculture Organization Of The United Nations : Rome.

affected is also expected to get larger during droughts, for example the area severely affected by *Rabi* droughts could increase from 4000 km² to 12000 km² as global warming increases.[9]

The reduction in rainfall in Bangladesh during winter will reduce the annual refilling of groundwater storing aquifers and a direct impact on rain-fed agriculture. This has huge implications for groundwater based irrigation which is already experiencing difficulties in different parts of the country in sustaining supply due to over-extraction of water and insufficient refill in the monsoon. The Survey and Monitoring of Groundwater Project has shown that the reduction in groundwater levels mean that 46% of cropland irrigated through shallow-tubewells can not draw enough water to supply farms in the dry season.[10]

The coast, the most vulnerable

Bangladesh has been ranked as the 3rd most vulnerable in the world to sea level rise in terms of the number of people affected and in the top ten in terms of percentage of population living in the low elevation coastal zone. Therefore the threat to the communities being forced away due to the effects of climate change is one of the most severe on earth.[11] Currently almost 40 million live in the coastal areas of Bangladesh but given the current the rate of population growth, by 2080 when the situation begins to get more sever it could be between 51-97 million in this vulnerable area. In year 2050 assuming a sea level rise of 27 cm, around 26 million people will be at a low risk and almost 7 million will be at medium risk of flooding, of which 58% of these people will be from Khulna, Jhalokati, Barisal and Bagerhat districts. In year 2080 assuming a sea level rise of 62 cm, 17 million, 12 million and 14 million people are expected to be at low, medium and high risk respectively.[12]

Drainage congestion, waterlogging and salinity

Drainage congestion is already a growing important problem in Bangladesh and is likely to be made worse by climate change (Tanner *et al*, 2007). Many factors like "higher than usual back water effect", unplanned river training etc linked to climate change and will make drainage more difficult and gradually increase water logging problems. This water logging will harm agriculture; make flooding worse and increase water borne diseases.[13] Drainage congestion

[9] Huq, S., Ahmed, A.U., & Koudstaal. 1996. *Vulnerability of Bangladesh to Climate Change and Sea Level Rise. Climate Change and World Food Security.* In: Ahmed, A.U. 2006. Bangladesh Climate Change Impacts and Vulnerability: A Synthesis. Dhaka : Climate Change Cell, Bangladesh Department of Environment.

[10] Roy, P. 2008. *Groundwater depletion hampers irrigation.* The Daily Star. Dhaka : March 9, 2008.

[11] McGranahan, G., Balk, D., & Anderson, B. 2006. *Low coastal zone settlements*. Tiempo. 59. 23-26.

[12] Mohal, N., & Hossain, M.M.A. 2007. *Investigating the impact of relative sea level rise on coastal communities and their livelihoods in Bangladesh.* Draft Final Report. Dhaka : Institute of Water Modelling (IWM) and Center for Environmental and Geographic Information Services (CEGIS). Submitted to UK Department for Environment Food and Rural Affairs in May 2007.

[13] Same as 1

occurs mainly from July to October when cultivation of transplanted *Aman* rice is damaged if water depth is more than 30cm for over 3 days.[14]

Currently, about 6.0 million people are already exposed to high salinity (>5 ppt), but due to climate change this is expected to increase to 13.6 million in year 2050 and 14.8 million in 2080 and the population in Khulna, Satkhira and Bagerhat will be most affected. Salinity negatively affects agricultural production and a study in Khulna, Bagerhat and Satkhira districts of southwest region of Bangladesh found that the suitable area for transplanted *Aman* rice cultivation will reduce from 88% to 60% with 32 cm rise in sea level and 12% with an 88 cm rise in sea level.[15] Potentially increased salinity in coastal areas could mean that 659,000 metric tonnes of annual rice production could be lost due to climate change.[16]

Cyclone disasters and coastal lives

As a result of climate change it is likely that future tropical cyclones will become stronger, with larger peak wind speeds and more heavy rainfall associated with ongoing increases of tropical sea surface temperatures.[17] Cyclones are expected to become 10 to 20% more powerful if sea-surface temperatures rise by of 2 to 4°C in South Asia, therefore the number of devastating cyclones will increase.[18] Cyclones are expected to have 3% to 12% faster wind speeds by the 2020s, rising to 4% to 20% faster by the 2050s.[19]

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[14] Same as 11

[15] CEGIS. 2005. *Coastal Land Use Zoning in the Southwest: Impact of Sea Level Rise on Landuse Suitability and Adaptation Options. (Draft Final Report)*. Dhaka : Center for Environmental and Geographic Information Services (CEGIS). Conducted for the Sustainable Environment Management Programme, Ministry of Environment and Forests.

[16] Habibullah, M., Ahmed, A.U., & Karim, Z. 1999. *Assessment of Foodgrain Production Loss due to Climate Induced Enhanced Soil Salinity. Vulnerability and Adaptation to Climate Change for Bangladesh.* Eds. Huq, S., Karim, Z., Asaduzzaman, M., & Mahtab. Dordrecht/Boston/London : Kluwer Academic Publishers. 55 – 70.

[17] Alley, R.B., Berntsen, T., Bindoff, N.L., Chen, Z., Chidthaisong, A., Friedlingstein, P., Gregory, J., Hegerl, G., Heimann, M., Hewitson, B., Hoskins, B.J., Joos, F., Jouzel, J., Kattsov, V., Lohmann, U., Manning, M., Matsuno, T., Molina, M., Nicholls, N., Overpeck, J., Qin, D., Raga, G., Ramaswamy, V., Ren, J., Rusticucci, M., Solomon, S., Somerville, R., Stocker, T.F., Stott, P.A., Stouffer, R.J., Whetton, P., Wood, R.A., Arblaster, D.W.J., Brasseur, G., Christensen, J.H., Denman, K.L., Fahey, D.W., Forster, P., Jansen, E., Jones, P.D., Knutti, R., Le Treut, H., Lemke, P., Meehl, G., Mote, P., Randall, D., Stone, D.A., Trenberth, K.E., Willebrand, J., & Zwiers, F. 2007. *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change: Summary for Policymakers.* IPCC Secretariat : Geneva, Switzerland.

[18] Cruz, R.V., H. Harasawa, M. Lal, S. Wu, Y. Anokhin, B. Punsalmaa, Y. Honda, M. Jafari, C. Li and N. Huu Ninh, 2007: *Asia*. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, (Eds.). Cambridge University Press : Cambridge, UK, 469-506.

[19] Tanner TM, Hassan A, Islam KMN, Conway, D, Mechler R, Ahmed AU, and Alam, M. 2007. *ORCHID: Piloting Climate Risk Screening in DFID Bangladesh.* Detailed Research Report. (Draft). Institute of Development Studies, University of Sussex, UK.

spatial dimension

Since climate change will have significant influence on water-related hazards and disasters, peoples' livelihoods will also be severely affected[20]. Not only subsistence agriculture will be affected adversely, food security of the poor people will be at risk, they will face adverse health effects due to outbreaks of pathogen-driven and water borne diseases, their settlements will also be deteriorated, and their overall quality of life will be diminished.

Hike in temperature would cause warmer water bodies of Bangladesh which might also impact on fisheries, such as by advancing the sexual maturation process of *Hilsa ilisha* fish and the timing of their spawning leading to a decline.[21] In terms of impact on livelihoods and the economy most affected by a rise in surface water temperatures would be Bangladesh's coastal shrimp farming industry, for if the temperature goes above 32^{o}C, the small shrimp fries would have high death rates. Warmer water would also encourage algal bloom which reduces shrimp growth[22]. Increased ocean temperature and thus changing ocean currents as well as increased water acidity due to more dissolved carbon dioxide, may additionally affect the marine fishing industry of Bangladesh by reducing catch size[23].

As discussed earlier, climate change vulnerabilities show spatial and temporal variability over Bangladesh mainly guided by the agro-ecological characters and hydro-geophysical settings. Therefore it is important to sort out the spatial vulnerabilities of expected disasters caused by climate change and concerned sectors that are most likely to be vulnerable. Table A gives a summary of expected spatial vulnerabilities in Bangladesh with reference to climate change. The Table is drawn from the NAPA document.

[20] Asaduzzman, M., Ahmed, A.U., Haq, E. and Chowdhury, S.M.Z.I., 2005. *Climate Change and Bangladesh: Livelihoods Issues for Adaptation*. Bangladesh Institute for Development Studies (BIDS), Dhaka.
[21] Ali, M.Y. 1999. *Fish Resources Vulnerability and Adaptation to Climate Change in Bangladesh*. In: Vulnerability and Adaptation to Climate Change for Bangladesh. Eds. Huq, S., Karim, Z., Asaduzzaman, M., & Mahtab. Dordrecht/Boston/London : Kluwer Academic Publishers. 113 – 124.
[22] Ahmed, A.U. 2006. *Bangladesh Climate Change Impacts and Vulnerability: A Synthesis*. Dhaka : Climate Change Cell, Bangladesh Department of Environment.
[23] Pender, J.S. 2008. *What Is Climate Change? And How It Will Effect Bangladesh. Briefing Paper.* (3nd Draft). Rajshahi, Bangladesh : Church of Bangladesh Social Development Programme.

Table A: summary of expected spatial vulnerabilities in Bangladesh with reference to climate change (reproduced from NAPA document)[24]

Climate and Related Elements	Critical Vulnerable Areas	Most Impacted Sectors
Temperature rise and drought	• North-west	• Agriculture (crop, livestock, fisheries) • Water • Energy • Health
Sea Level Rise and Salinity Intrusion	• Coastal Area • Island	• Agriculture (crop, fisheries, livestock) • Water (water logging, drinking water, urban) • Human settlement • Energy • Health
Floods	• Central Region • North East Region • Char land	• Agriculture (crop, fisheries, livestock) • Water (urban, industry) • Infrastructure • Human settlement • Health • Disaster • Energy
Cyclone and Storm Surge	• Coastal and Marine Zone	• Marine Fishing • Infrastructure • Human settlement • Life and property
Drainage congestion	• Coastal Area • Urban • South West	• Water (Navigation) • Agriculture (crop)

Poor hit hardest

Poorer people are more susceptible to the destruction caused by cyclones and flooding for a variety of reasons. The poorest are the easiest victims of climate change because:

- Poverty exacerbates, and is exacerbated by, the impacts of climate change;
- Poor people's livelihoods are highly dependent on natural resources which are highly climate sensitive; they are the primary producers in our society.
- Poor are already struggling to cope with the extreme weather events;
- Poverty stricken people often lack infrastructure for dwelling units or farms, which made them vulnerable against natural disasters; and
- They are living in extreme poverty, so they cannot even a little hike in production costs.

[24] GOB, 2005. *National Adaptation Programme of Action (NAPA)*, Final report: November 2005, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh (GOB), Dhaka, 48 p.

It is important to understand that in Bangladesh the climate change hazards are related to water sector. The country's agriculture, fisheries, sand ettlements—all are dependent on spatial and temporal distribution of water. The expected climate changes hazards are also water related; for example—flooding, droughts, cyclones, salinity, waterlogging, river erosion etc. Each of these hazards contributes separately to poverty. One instance is discussed here.

Natural Infrastructure

As understood, climate change will interact with 'agents of change' which in turn would cause change in natural conditions (endowment, availability and quality of natural resource base; geo-physical characteristics; climate-induced primary phenomena etc.), it is necessary to characterize these and identify how climate change induced effects would modify conditions/state of each of these elements of nature[25]. A thorough knowledge-based characterization of natural condition/setting enable people to understand the dynamics of the impacts of climate change over time and help identify appropriate measures to manage climate risks.

There are large numbers of elements which might help define natural condition in Bangladesh. The following are most common indicators that describe natural conditions: physiology, proximity to the sea, landscape and terrain, watersheds, land type characteristics, land elevations, land cover, land use, state of land degradation; soil quality, major crops and cropping patterns, forest cover, ecosystems and ecosystem health, river network and flow regime, tidal dynamics, erosion and accretion (morphological) processes, drainage congestion, cyclone and storm surge characteristics, salinity intrusion, drought and dry periods, (seasonal) soil moisture, humidity, temperature regime, ground water (availability and quality), precipitation pattern, availability of safe drinking water etc[26].

Socioeconomic infrastructure

There are five categories of livelihoods capital assets (human, social, natural, physical and financial) and these play decisive roles in determining one's contexts of vulnerability. Socioeconomic conditions of an individual, a household, a community, and a society (or even the whole country) determine how the contexts of vulnerability will change to adjust to underlying risks (of the subject) due to change in exposure of any hazard. IUCN reported that, absolute poverty would have lesser means to enhance resilience and reduce risks from exposures to climate driven livelihood hazards[27]. To better understand human and economic

[25] Kamal Uddin et al., 2008. Climate Resilient Development: Country Framework to Mainstream Climate Risk Management and Adaptation: Working Paper. Climate Change Cell, DoE, CDMP-DFID.
[26] Same as 15
[27] IUCN, SEI, IISD, SDC, and InterCooperation, 2003. *Livelihoods and Climate Change*, Winnipeg, Canada, pp. 24.

conditions analyzing a number of vulnerability contexts that characterize a few aspects that include livelihoods as essential. Such analyses may include status of gender equity; social capital; networking and kinship; status of nutrition; population growth rates; infant mortality rate; fertility rate; access to productive resources; labor and wage conditions; the proportion of functional landless; seasonal migration dynamics; demographic dependency ratio; level of service provision and density of growth centers; literacy rate and primary school densities; primary school enrollment rate; per capita GDP; the share of the industrial sector in GDP; household coverage by credit servicing agencies including NGOs; development of private sectors etc[28].

A number of the above mentioned indicators are applicable for the entire society, whereas a few of them are particularly important to identify and characterize socio-economic conditions of major livelihood groups. It is important to develop socio-economic profiles for the major livelihood groups in an area to establish links between livelihood activities and climate-related risks. Application of Sustainable Livelihoods Framework (SLF) can be of great help to this end. Once the interaction between Livelihood Capital Assets (LCA) and agents of change under altered climate conditions are superimposed, the effect of climate change on livelihood strategies and livelihood outcomes may easily be identified, as indicated in the SLF. A number of tools may be employed for such a participatory process. The use of SLF, involving a series of Focus Group Discussions and Key Informants' Interviews or the much elaborated Participatory Vulnerability Assessment (PVA) technique of Action Aid International[29] may be utilized for these purposes. A good number of early applications have already shown the strengths of such methodologies.[30]

Physical Infrastructure

Physical infrastructure can either play negatively or positively. It may either help reduce vulnerability (a public infrastructure transformed into a shelter during a hazard or may also increase risks by aggravating certain types of problems (road network aggravating floods by creating obstacles in drainage systems. Mapping and characterizing physical infrastructure are therefore necessary to understand the exposure to climate induced phenomena, performance

[28] Same as 15

[29] AAI, 2002. Participatory Vulnerability Analysis. A step-by-step guide for field staff.

[30] Schaerer, C. and Ahmed, A.U., 2004. *Adaptation to Climate Change in Vulnerable Communities: Lessons from Practice in Southwestern Bangladesh*, in A.U. Ahmed and Haque, N. (eds.), Adaptation to Climate Change: Knowledge Sharing for Capacity Building, Proceedings of Workhop held on 10 December 2003 at COP 9 Milan, Climate Action Network South Asia (CANSA) and RVCC, Dhaka.

capability under changed conditions, and overall risks of these infrastructures to climatic hazards.

Examples of physical infrastructure include roads and highways, health care centres (hospitals/ clinics/dispensaries etc.), urban centers, village growth centers, industries and factories, school buildings, ports (inland and sea-bound), disaster rehabilitation centres (shelters such as multi-purpose cyclone shelters), settlement infrastructures, utility and communication infrastructures, embankments and polders, flood management and irrigation infrastructure and other infrastructures that support livelihood activities. Likelihood of occurrence of hazards such as flood, riverbank erosion, drought, salinity intrusion, cyclone, storm surges, winds, erratic fluctuations in precipitation and temperature, drainage congestions/water logging and their magnitudes and extents generally determine the degree of impacts on the physical infrastructure[31].

Institutional infrastructure

The intersection of vulnerability with governmental, nongovernmental and civil society institutions defines the outcome of poor society. For example, presence of credit institutions and the local poor having access to such institutions hugely influence livelihood outcomes, aftermath of a major hazard**.** A detailed analysis of institutional setting, a clear understanding on the institutional gaps, and an assessment of policy needs to tackle climate change can be of great help.

According to a working paper of Climate Change Cell[32] describing country framework, a typical information base on institutional infrastructure should encompass the following:

- A mapping of national institutions with defined respective mandates and service delivery mechanisms;
- The processes of inter-agency and intra-agency collaboration and cooperation, with special references to climate induced slow-onset as well as rapid-onset hazards;
- Local through to national level support organizations including voluntary agencies, NGOs, networks, and efforts; their respective roles and capabilities;
- Linkages among public, private, and voluntary agencies towards delivering certain necessary services, those are necessitated due to climate driven events and extremes;
- Identifying gaps between intended/anticipated service requirements and actual service capabilities;
- Analysis of the needs for new organizations/institutions;
- Assessment of current policy and regulatory regime; existing gaps in policy regime;

[31] Same as 15
[32] Same as 15

- Identification of specific needs for new/alternative policies to offer better services those are necessitated due to climate driven events and extremes etc.

Based on these building blacks described above we have to take initiatives to collect local level evidences of climate change, information on vulnerabilities, especial contexts, livelihoods options etc. These would determine the next step, which is the assessment of necessities of the nation. Based on those necessities policy should be formed to integrate every aspect of climate change. Figure 1 illustrates a suggested process/mechanism of building a climate change policy in Bangladesh. The Figure suggests the whole mechanism of the climate change policy should be livelihoods driven.

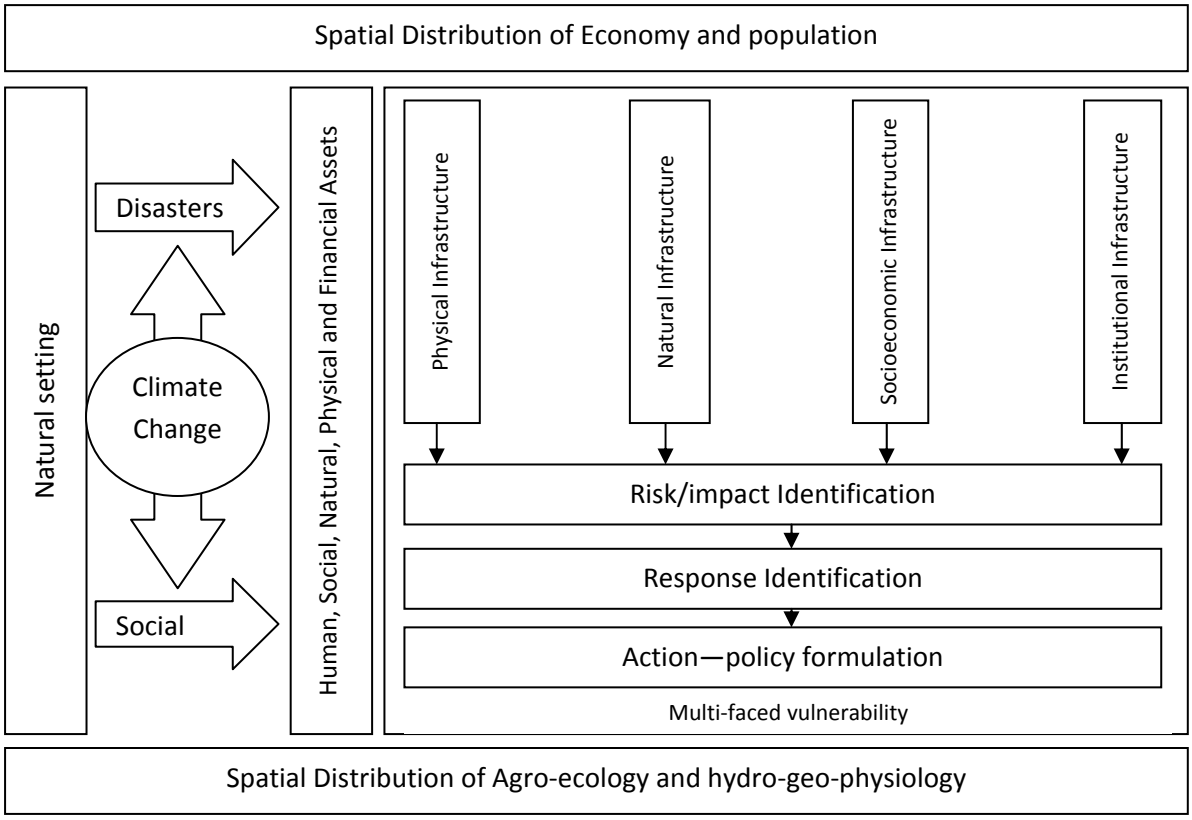

Figure 1: Mechanism of a climate change policy formulation for Bangladesh

CHAPTER THREE
Strategic Elements

The priorities and concerns

The environmental impacts of climatic change would impose vulnerabilities. The threats to the socio-economic systems are expected to form serious threat to development and poverty reduction in Bangladesh. As revealed earlier**,** the causes of climate change (mitigation) and minimizing the consequences (adaptation) therefore need to be addressed with utmost priority**.** It should be understood that these two are inherently linked processes and are both essential for building a policy framework for Bangladesh. Worldwide, as well in Bangladesh, two issues regarding climate change have received much less attention: financing and technology transfer.

Principles

The principles are laid out explicitly in the UNFCCC, not only in Article 2 (Objectives), but also in the Preamble and in Article 3 (Principles). To reiterate, UNFCCC Article 3 (Principles) sets out five principles:

- Common but differentiated responsibilities
- Protection of the Vulnerable
- Protection of the Right to Development
- The Precautionary Principle
- Promotion of an open economic system to support sustainable development

The strategic elements or basic components that would form the climate change policy in Bangladesh might be defined as a progressive series of three steps:

Defining present situation and forecasting future outlook>enabling process and action>institutional mainstreaming

Defining present situation and forecasting future outlook

As defined earlier, the four building blocks of climate change policy would determine the present situation and suture country specific outlook of climate change. Given that risks and threats of climate change on livelihoods are situation specific and context specific, a climate change strategy would give priorities on specific natural and socio-economic settings at different parts of the country. A combination of perceived (and plausible) changed conditions and imposed scenarios of climate change and change in the climate variability shall identify future risk[1].

[1] Kamaluddin et al., 2008. Climate Resilient Development: Country framework to mainstream climate risk management and adaptation. Climate Change Cell, DoE, CDMP and DFID.

Present and future pattern of climate change should be most important concern of the strategy building process that would also serve for the present and future as well. Sector specific vulnerabilities and response to climate change has to be taken into consideration, as said previously. The worries and concerns characterizing the risk environment and pin pointed risks have to be interpreted in terms of sectors and specific response and action plans are to be developed consequentially. Identification of future climate change risks also have to be defined. These future risks will be assessed based on the building blocks mentioned already: natural condition, status of physical infrastructure, socioeconomic condition, and institutional setting. Any or all four of these aspects might exhibit significant changes, which need to be flagged based on trends, projections, and expert judgments.

Perception of climate change and vulnerabilities of local communities are also of vital importance, as action plan has to livelihood driven to reduce the risks. It is of value to understand the perception of the local community regarding climate characteristics and trends in their neighborhood for various different time scales covering the past, the present and the future projection year(s)[2]. Future projection of climate change and socio-economic changes through modeling exercises and other researchers are also of importance and should be priotised in the development of action plan. Flexibility over time scale and spatial scale are also important while defining present and future.

Enabling process and action

Defining enabling process is the next logical step. While analyzed climate change risks in all possible sort of processes, predominantly through participatory analysis and researches, an action plan of responses developed would ensure a process of implementation via provision of a framework on enabling environment. Institutions would play major roles in establishing an enabling environment. As defined, the first step at this stage is to prepare a response plans towards reduction of risks identified. Responses do not necessarily depend on 'specific planning' and 'firm actions' of the Government, but also on enhancing human and institutional capacity[3].

An ideal climate risk reduction action plan would necessarily be developed through participatory processes after raising a firm level of awareness amongst all stakeholders, from and should be merged with the normal development plan of the country with high priority. It should be based on the principle of participation as well as of integration across sectors and scales. Talking about merging climate change risk reduction plan in the normal government's development plan, climate-related risks has to be identified in (Sectoral) Development Plans

[2] Same as 2

[3] Same as 2

mostly applicable at meso- and regional-scales where each community level needs identified would be incorporated in those sector specific plans for better integration and synergy.

Raising awareness in all level demonstrate increased capacity building to respond climate change[4]. In order to create general awareness among all levels and allow everyone in a community to respond in their own way, it appears extremely important to inform every member of a community in a vulnerable area. Therefore, awareness raising and easy and open access to information regarding climate change and various implementing techniques like trainings, media campaign, continuing education etc are of utmost importance. A wide array of stakeholders, representing grassroots people through to national level policy makers, need to be involved in responding to such awareness campaigns. It should be understood that only provision of information for all communities is not the ultimate answer, as building communities to respond climate change would also require collective efforts, therefore tie up of very level of communities with each other (i.e., civil society, poor and land less communities, farmer communities, local government institutions, media communities etc.) is necessary.

Successful responses to climate change at micro levels should be identified while building the policy framework and should be replicated in such areas where responses are weak. It is therefore necessary to investigate current and past adaptive responses of various vulnerable groups to climate-related risks and initiate demonstration of good practices for wider acceptance and replication.

A holistic approach should also be taken to identify the potential inter and intra policy conflicts and try to make them stand on a common ground that ensures community participation in every steps. The action plans to negotiate climate change should be built from local communities, as mentioned earlier. These action plans should run under the community stewardship (of course these communities include local government institutions, and other participant mentioned earlier) on priority basis with the political blessings subjected to available financial resources. It can be expected that 'trained professionals', with the facilitation of 'aware local stakeholders', will be able to take the responsibility to respond to challenges of climate risks in a more sophisticated manner.

Institutional mainstreaming

Climate change mainstreaming, after thorough processes of participatory analysis and subsequent identification can be implemented within an appropriate institutional enabling environment. Bangladesh has to develop its own plan to mainstream climate change in policies given that; there are some ambiguities in global institutional architecture of mainstreaming

[4] Ahmed, A.U. and Schaerer, C., 2004. 'Sustaining Livelihoods Opportunities for the Coastal Poor Under Climate Change: A Case Study from Bangladesh', In Anonymous (ed), Proceedings of Coastal Zone Asia Pacific, Brisbane, 7-9 September 2004.

process. The enabling process and actions would determine the policy mainstreaming in institutions in Bangladesh.

Institutions are policy driven. The institutional mainstreaming might come from policy adjustments and institutional adjustments. The policies and action plans developed at the community level may or may not concur with the current policy regime either practiced or envisaged by the government. Here lies the necessity of identification of policy gaps and necessary policy adjustment. Therefore to respond climate change in a sophisticated manner, policy adjustments along with development of new policies are essential.

The process of institutional mainstreaming of climate change should focus on a set of activities that promote a better understanding of the needs of climate risk management through building partnership among stakeholders and stimulate and support climate resilient development process in the country. This should emphasizes on involving of local as well as national institutions taking part in the community level development of climate change action plan efforts at local, regional (sub national) and national levels with a primary focus on serving national development agenda, integrating adaptation measures, and addressing cross-cutting national issues (e.g. women's empowerment and advancement, ecological conservation and sustenance, integrated coastal zone management, safer islands etc.). The process also will bring into play the government line agencies providing development service at the local level, NGOs, CBOs, informal social organizations, civil society, local government institutes, etc., with the community and its needs and priorities at its center. In addition national level NGOs, research and academic Institutes also should contribute their input in the development planning and its implementation. The needs and requirements of the climate resilient national plans is eventually shared, by national policy makers, designated national focal points, investors, bilateral and multilateral institutions.

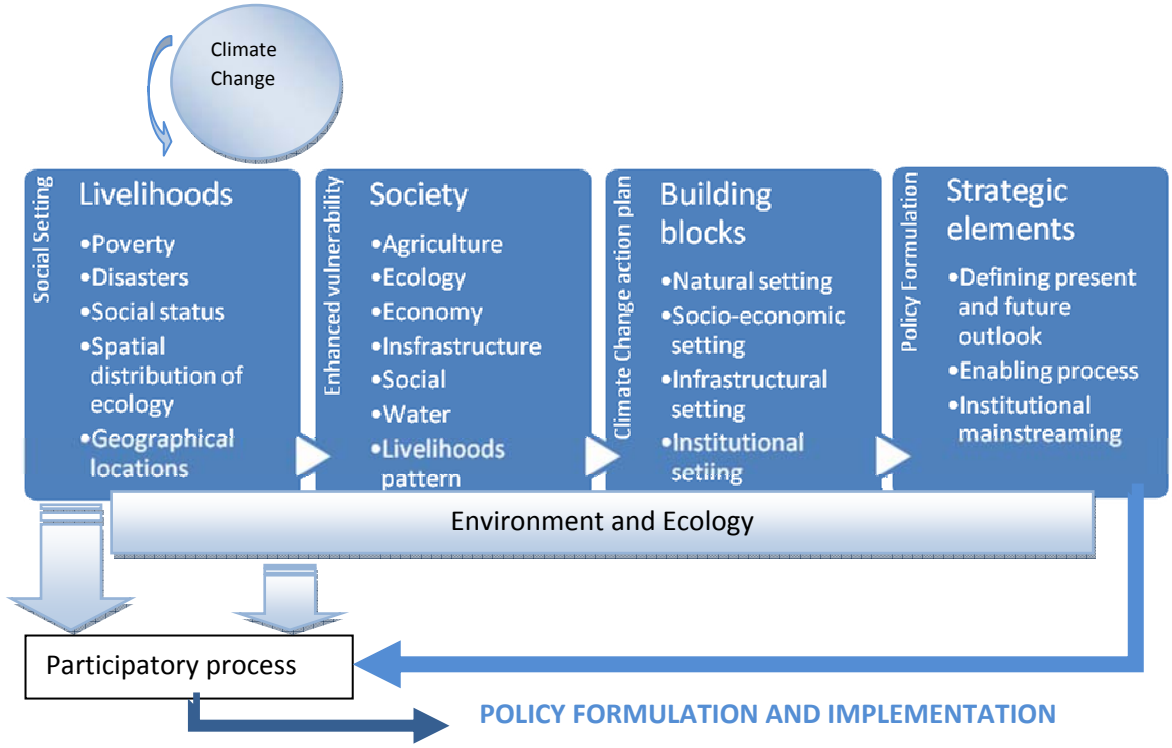

Figure: Climate change policy formulation process

CHAPTER FOUR
Financing Climate Change

Climate Change policies: Issues and facts

Financing is an important issue in implementing identified actions, options and measures under a formulated policy. A financing mechanism is essentially a regulator as well as limiting factor of implementing an action plan. A clear policy on financing mechanism is essential in Bangladesh. Before that, it is essential to define the cost of adaptation and mitigation clearly and identify what should be called as adaptation or mitigation and how they should be handled. There are three issues that determine how the finance mechanism would work efficiently: the first issue is primarily of how we define cost of adaptation or mitigation. Secondly, in economics, the real cost of any action is the opportunity forgone i.e. the cost of the best alternative use of the resources expended. What is the opportunity cost of adaptation and how does one estimate its time path i.e. at what time in future a country bears that cost[1]. The second issue is how the money would be raised and who should be paying. The third issue is the mechanism of financing: how the funds will be allocated, who will get it and how it will be distributed. The Bali CoP (CoP 13) adopted the 4 areas for support to developing countries proposed by the UN: *Mitigation* – for Annex-1 and also some advanced developing countries (China, India, Brazil, Mexico etc); *Adaptation* – for developing countries primarily; *Technology Transfer* – for clean energy and energy efficiency and *Finance* – Adaptation Fund for Least Developed Countries (LDCs). It is clear from the Bali CoP that financing is mainly oriented with adaptation, and followed by technology transfer and mitigation. Most of the estimates of financing done worldwide are based on adaptation financing. The issue of mitigation and technology transfer financing has been the least discussed.

What we have and what is needed

There is no robust estimate of how much financing would be required for Bangladesh and on what time scale. However, there are some global estimates of available adaptation financing which might be possible to guesstimate for Bangladesh. Table A gives a rough estimate of the available financing worldwide to support adaptation for the LDCs.

[1] Asaduzzzman. M. 2008. *Paying for Climate Change: For whom, By Whom and How*: Keynote speech delivered at the Conference on Financing for Climate Change – Challenges and Way Forward. Dhaka, Bangladesh August 16, 2008

Table A: Summary of the global estimates of adaptation financing available (adapted from Begum, 2008[2] and Ahmed, 2008[3])

Types of funds available for financing Climate Change	2030 USD Annum	Pledged until June 2007	2030 CDM 2 % USD
Adaptation	>100b		100m-5 Billion
Adaptation In Developing Countries	28-67b		
Adaptation Pilot Fund/Climate Resilience Pilot Program proposed by World Bank (2008)	300-500b/annum		
Mitigation efforts needed to return global greenhouse gas emissions to current levels	200-210b/annum		
UNFCC (Bilateral Agencies, Private Sector, Trust Fund)		186 Million (GEF)	
Special Climate Change Fund	~265m	67 Million	
Least Developed Countries Fund		160 Million	
GEF SPA	~50m		

Many organizations estimated the annual funding required for global adaption. According to the UNFCCC the requirement is**:** $28bn-$67bn by 2030. The UNDP estimates this should be$86bn by 2015 while according to Oxfam, the requirement is at least $50bn.

The financial mechanism for implementation could be National revenue funds, Bilateral donor funds, Multilateral donor funds and International convention fund including GEF trust fund, LDCF, SCCF, CBA, Adaptation Fund (Kyoto protocol), CER, CDM, Joint Implementation, ET. Current and potential future sources of funding for climate change adaptation include:

- Global Environment Facility (GEF)
- Adaptation Fund – yet to be operationalized under Kyoto Protocol
- Least Developed Country Fund (LDCF) – for NAPA and other projects of LDCs, operated by GEF/UNFCCC

[2] Begum, A. 2008. *Financing Climate Change in Bangladesh: Review of Options*, Paper presented at the Conference on Financing for Climate Change – Challenges and Way Forward. Dhaka, Bangladesh August 16, 2008.
[3] Ahmed, A. U. 2008. *Towards an institutional architecture for financing adaptation: A developing country perspective*, Paper presented at the Conference on Financing for Climate Change – Challenges and Way Forward. Dhaka, Bangladesh August 16, 2008.

- Special Climate Change Fund - GEF/UNFCCC, for all developing countries, both mitigation and adaptation
- Climate Investment Fund – yet to be launched
- Cool Earth Partnership- Japan, US $ 10 billion over 5 years– mostly mitigation based- will promote energy and economic growth in compatible ways in developing countries.
- Carbon-MDG Fund – recently launched by UNDP for mitigation

The Bangladesh Government has also taken a positive initiative to finance climate change adaptation of its own. The amount is 300 Crore BDT (approx. US$43 million) which would be in operation from 2008-2009 financial year. A committee was formed by the government to initiate and control the activities of the fund. The convener of the committee is the Secretary of the Ministry of Environment and Forestry (MoEF). A separate committee headed by the Secretary of Finance will manage the fund. About 66 percent of the fund will be utilized during a specific financial year while the rest 34 percent will be deposited for interest[4]. However there are criticisms of this fund which include: *mechanism of fund management* (i.e., lack of clear management structure, role, responsibilities); *fund discursion modalities* (i.e., no clear direction of who will get the fund, and how much he will get); *scope of fund coverage* (i.e., the thematic areas of funding, how many sectors would be covered by funding) and *criteria for fund eligibility* (i.e., on what type of project the fund will be disbursed, what type of organization will get it).[5]

The framework

As defined in the earlier chapters, the framework for a climate change policy in Bangladesh would follow 3 major strategic elements based on the 4 building block defined. The framework recommend later onwards in this chapter is based on the building blocks and strategic elements already defined earlier.

1. Mitigation is first, mitigation is must. The global communities have already committed a net warming exceeding 2.4°C, even if the rise in emission 'peaks' by 2015. The developed countries would take the responsibilities of mitigation while a LDC country like Bangladesh who emits one fifth of one percent of global CO_2, has mere responsibilities in mitigation. In this Bangladesh has to raise its voice in international community to keep pressure on the developed countries as well as the newly industrialized countries for initiating mitigation process. Adaptation is also vimportant too. For developing countries like Bangladesh, adaptation is a must to fight climate change enhanced vulnerabilities of poor.

[4] Ali, M. S. 2008. *Financial options to address Climate Change Present and Future:* Paper presented at the Conference on Financing for Climate Change – Challenges and Way Forward. Dhaka, Bangladesh August 16, 2008.

[5] Sayeed, S. K. 2008. *Financing for Climate Change*: Paper presented at the Conference on Financing for Climate Change – Challenges and Way Forward. Dhaka, Bangladesh August 16, 2008.

2. Bangladesh has to present a robust estimate of how much is needed for her adaptation at present and in future. The climate change action plans developed at the lowest tier of government machineries participated and formulated initially by the affected communities should be basis of this calculation. It also has to count how many years Bangladesh in planning for, and by the time how much its financial state might change. For example, by 2030 Bangladesh is going to declared a middle income nation, which might change many of the well being indicators and uphold the standard of living, which eventually might need additional financing.

3. Bangladesh is on a developing curve while the effects of climate change might incur severe damage to its strides. Bangladesh has to make its position strong to the global communities for repaying her loss which should be calculated on the basis of a combination of monetary analysis, time loss and opportunity cost.

4. Bangladesh should also look forward to Technology Transfer (TT). Present experience demonstrates a lack of capacity of Bangladesh as a country to grab the opportunities of TT mechanisms like Clean Development Mechanism (CDM). Lack of updated information and ensuring of climate change awareness in all level only can bring Bangladesh the capacity to grab the opportunities remaining in TT that are already are used by India and China. Learning from these two big countries also could be of immense help for the country.

Policy formulation process

1. The complementarily of current policy regime in relation to adapting to climate change should be analyzed in order to define which aspects of adaptation are already in place. This would not only advance national (also regional and local) development processes, but also would reduce vulnerability of people to climate change. The work load in this respect might be significantly reduced if there is a separate national adaptation policy[6]. Implementation of the NAPA is necessary in this course.

2. The analysis of current policies, that would identify the current policy gaps, should create the channel of adopting new policies. These new police, as mentioned earlier chapters, should be based on the participatory mechanism and developed at the community level and run under community stewardship. Since climate change would affect the poor the most, adjusting poverty alleviation policies and programmes to accommodate the increasing needs of adaptation in Bangladesh is a must.

3. Formulated policies of climate change should cover all aspects including: adaptation finance, TT, development planning etc. The policy must be livelihoods driven as climate

[6] Kamaluddin et al., 2008. *Climate Resilient Development: Country framework to mainstream climate risk management and adaptation.* Climate Change Cell, DoE, CDMP and DFID.

change will affect people's livelihoods. Therefore the action plan and implementation of climate change policies should concur with people's opinion who the most affected or going to be most affected. The policies formulated also should be flexible over time and over space, as Bangladesh, despite of a small country show huge variation in ecological characters and being a developing country demonstrates changing situation over short period of time. Therefore temporal and spatial adjustment of policy and the process of adjustment should also be in the policy formulation agenda.

Institutionalization of climate change

1. As mentioned earlier, a micro-level climate change risk reduction plan should be developed by the communities, i.e., bottom most tiers of the local level government and the vulnerable communities that already are and would be the most vulnerable to climate change effects. The process should initiate local level action ensuring the participation of grassroots people, NGOs, civil societies, academic and research institutes etc.

2. Raising awareness among all level has been proved as an effecting tool to supplement the community movement to adapt with climate change. In order to create general awareness among general stakeholders and allow everyone in a community to respond in her/his own way, it appears extremely important to inform every member of a community in a vulnerable area. Forecasting, information dissemination etc should therefore be a part of the climate change adaptation policy of Bangladesh supported by a good amount of allocation for financing such activities.

3. It has been mentioned in several literatures that the level of awareness on climate change is rather low and inadequate in Bangladesh though it is a prerequisite for good adaptation. The information like expected change in a particular location, expected impacts, possible ways to deal with the changes might occur can improve a community's response to climate change and enhance its activities to develop resilience. Therefore raising awareness on climate change issues must be of top priority in all action plan and policy formulated for Bangladesh. Specific issues of awareness raising like usage of media, community movements, fairs etc. should be developed from the community level and encouraged by the government.

4. Stakeholders at various levels with different responsibilities and mandates should be properly oriented to conceptual and multi-faceted issues such as sustainable development, globalization, gender etc. as without it might not be possible for them to analyze risks and challenges associated with development processes in relation to above mentioned issues. It is therefore necessary to provide orientation training for the professionals, especially those designing and carrying out development activities at the grassroots.

5. Skill development trainings should be mandatory for key professionals, especially those designing small to large-scale development projects and developing plans on behalf of their respective Ministries/Divisions/Directorates/Departments. The planning people at the local through to central levels of the relevant government agencies need to be oriented and trained on climate risk management. Having proper training, it is expected that the professionals will be able to appreciate and conduct participatory climate risk assessments with communities at all levels and develop risk reduction action plans as necessary. Capacity enhancing training involves hands on sessions on participatory planning, sustainable development, and interpretation of climatic risk reduction into concrete enabling activities[7].

livelihoods development

1. As mentioned earlier in this chapter, a community centered approach should be taken to develop policies which should address development as well. Which means adaptation should be integrated into development planning process to ensure that adaptation needs are incorporated across sectoral plans, mainstreamed into national and local strategies, and backed up with the budgets needed. "Poor people also have right to development" should be basis of the national policy formulation of Bangladesh where climate change issues should be incorporated.

2. The policy action plan should also promote appropriate technologies such as resilient crop varieties, irrigation schemes, and renewable energy sources, so that they are available and affordable for low-income communities of Bangladesh. Also an action plan of shielding communities financially though different activities i.e., social-protection scheme, guaranty of employments etc. should be formulated with the participation of affected people. Protection of existing infrastructure and introduction of ecological management is also of outmost importance.

3. Demonstrated good practices at vulnerable community levels, state levels and global level should be implemented and replicated for other regions of the country. Because of many social drawbacks, there can be different adaptive measures/practices in different parts of a country. Many of such adaptive measures/practices could be replicated elsewhere within the country, even outside the country where similar vulnerability exists. It is therefore necessary to investigate current and past adaptive responses and coping strategies of

[7] Same as 6

various vulnerable groups to climate-related risks and initiate demonstration of good practices for wider acceptance and replication.[8]

Financing mechanism

1. It's been believed by the economists that climate change is the greatest market failure of the history of mankind. Climate is natural, therefore a common property. For this reason, climate change related economic does not follow the prevailing market mechanism. Therefore, it should be understood that, the rich countries which are polluting should start paying for adaptation for the LDC and also start paying for mitigation within their countries. Bangladesh should make its position clear in favor of this logic in all negations and raise its voice.

2. Additional finance for adaptation must not come out of existing aid commitments. Development is essential to enable poor people to adapt successfully, but it is still hugely under-funded: donors must live up to the commitment of providing 0.7 per cent of gross domestic product (GDP) in order to eradicate poverty. Adaptation finance cannot be rebranded or diverted from aid commitments, and must be reported systematically and transparently. In line with the 'polluter pays' principle, it is owed not as *aid* from rich country to poor country, but as *compensatory finance* from high-emissions countries to those most vulnerable to the impacts. There are many innovative mechanisms for raising this finance independently from aid, which deserve full consideration.[9]

3. Often normal development activities are mixed up with adaptation activities. It should be remembered that money is given to Bangladesh for damages inflicted on the country. Therefore it is compensation and based on the principle that it never can be loan. Loans may be acceptable for normal development activities. But in a world of climate change, many of the "normal" activities at the time climate change in future will have to be climate-resilient to be of practical use and would thus be "adaptation" in today's language. Such activities should therefore be also candidates for grants, not loans. In any case, this means that in future, a fine balance may have to kept between loan and grant as they apply to "normal" development activities in the future with climate change.[10]

4. It should be well understood that the adaptation funding that is generated every year globally is not adequate, in fact far less than it is needed. Bangladesh government has taken a positive step in internal resource mobilization, as a moderate fund on climate change

[8] Same as 6

[9] Oxfam, 2007. *Adapting to climate change. What's needed in poor countries, and who should pay*, Oxfam Briefing Paper 104, Oxfam International.

[10] Same as 1

adaptation has already been created (see above). Now Annex I countries and multinational donors have committed to support adaptation financing worldwide. Bangladesh also has the opportunity to ensure a funding. A very careful technical and economic analysis needs to be made in this case. Bangladesh must be able to carefully analyze and take decision regarding each proposal. She has to make sure that these funding support her normal development activities as well as special preparation of adapting climate change.

5. There exist a few inter-sectoral policy conflicts, which might be counterproductive towards implementing adaptation and financing mechanism[11]. It is recommended to establish an appropriate institutional regime, supplemented by the creation of a policy and regulatory regime. It is also recommended that the proposed Climate Change Strategy should be housed and implemented under a supra-ministerial institutional platform, in order to facilitate its smooth functioning and to avoid unnecessary confusion. The proposed institution must be adequately empowered so that it can operate in cooperation with other relevant sectoral ministries. To facilitate its functions, it may invite designated ministerial focal points to ensure coordination and cooperation among relevant line ministries.[12] A possible process of coordination and harmonization of financing mechanism in Bangladesh has been illustrated in the next chapter.

Negotiations: Safe guarding national interest

The climate change negotiations do not take place in isolation from other developments on the global agenda, and actions in other areas of foreign policy will have impacts on climate change and influence negotiations in the climate change sphere. In the overall conduct of climate change negotiations; there is a need to pull back from the traditional mode of negotiations to move towards for protecting national interest. Engaging in strategic bilateral talks with those developing countries are also key to both the post-Bali and post-2012 negotiations and looking for cross-issue agreements might foster progress in negotiations while safeguarding the national interest.

International response to enable countries to cope with climate challenges are manifested in the inter-governmental climate change negotiations, development assistance framework of developed countries and communities, and the developing countries, particularly the Least Developed Countries (LDCs) like Bangladesh. The UN Framework Convention on Climate Change (UNFCCC) is the most significant process to address climate change concerns at the global level. There are currently ten agenda items in the Climate Change Convention that

[11] Ahmed, A.U., 2004. *A Review of the Current Policy Regime in Bangladesh in Relation to Climate Change Adaptation*, CARE-Bangladesh, under Reducing Vulnerability to Climate Change (RVCC) Project, Khulna.

[12] Ahmed, A. U. 2006. *Bangladesh Climate change impacts and vulnerability: A synthesis*, Climate Change Cell, CDMP, GoB.

address vulnerability and adaptation in the context of climate change negotiations, with particular attention having been given to issues relating to Article 4.8 and 4.9, and to scientific and technical aspects under the relevant SBSTA agenda item on adaptation[13].

It is recommended that, a ccontinued engagement in negotiations and development of scientific background for adaptation should be recognized as activities which would eventually facilitate institutional adaptation in the long run. **Negotiating team should be backed up by latest science and information on country-wide impacts.** Bangladesh also have to immediately finalize a National Climate Change Strategy and Action Plan with a clear vision, short, mid and long-term programmes to face adverse impacts, and ensure food, water, energy and livelihood securities. Therefore, **the negotiators would serve on the basis of national climate change framework for Bangladesh.**

[13] Same as 6

CHAPTER FIVE
NEGOTITING AGENDA

From the perspective of Bangladesh, it is important to ensure two things: First, any targets that are adopted universally combine both climate and development objectives; and second, that the Bangladesh becomes an advocate for *both* goals rather than being relegated to the sole and exclusive advocacy of developmental goals.

Temperature Increase: There is a broad consensus over limiting global temperature increase to 2 degrees Celsius or less over pre-industrial levels. It is critical that the G77 assumes a position of leadership in this regard, and helps the world community unite behind this goal.

***Development Targets*:** There is a broad consensus, articulated explicitly in all global conventions and agreements (including in particular, the UNFCCC, Agenda 21, JPOI, and the Millennium Declaration) that developing countries have a right to sustainable development. The global players also agreed that that all actions should be framed in a way so their rights were not undermined or affected in any way, and that developed countries have an obligation to provide financial assistance and access to technology to developing countries to assist the latter in realizing this right.
A simple way of realizing this target is to agree that the emission targets for developed countries would be residual after deducting the necessary emissions needed to sustain the growth momentum in developing countries from the agreed global emissions target. Viewed from this perspective, under current trends, the aggregate net emissions of developed countries would have to decline to zero by 2020, and should be negative thereafter.

An Agenda for Action
Mitigation
The international community agrees an equitable, binding and quota-based post-2012 framework to stabilize temperature increases at no more than two degrees Celsius above pre-industrial levels.

Temperature Increase: There is a broad consensus over limiting global temperature increase to 2 degrees Celsius or less over pre-industrial levels.

Carbon dioxide Concentration: Therefore (based on current scientific understanding), to limit carbon dioxide concentration to 450 ppm or less.

Global Emission Targets: Again, based on the current scientific understanding of what is required to preserve a high likelihood of keeping global temperature increase below 2^{o} Celsius, that global emissions peak before 2020 and be reduced by 50 to 80 per cent below their 1990 level by 2050.

Developed Country Targets: The only issue on which there is close to a global consensus is that Annex I countries should adopt deeper and more meaningful targets in the immediate post-

Kyoto period as well as for the longer term, and should demonstrate strict compliance with these targets. These targets have to be derived from both global emission targets and developing country requirements. In other words, it needs to be ensured that developed country climate strategies are consistent both with the global emission targets, and global development targets, and that every effort is made to ensure that the development momentum is not undermined either by an increasingly disrupted climate or by unmeetable climate obligations.

National or Regional Targets: Many developed countries propose that the global targets should be translated into national targets for all or most countries, including developing countries. Developing countries have consistently and firmly rejected such proposals, in large part because such demands pay no attention whatsoever to differential responsibilities, capacities, and situations and contexts. These demands often hint at vague amounts of financial resources or promise of technology transfer, but past experience of such promises has failed to build sufficient confidence in their delivery. Another major problem with national targets is that they lock in a huge advantage for developed countries.

Market Based Mechanisms: The Kyoto Protocol introduced a number of market based mechanisms to reduce the costs of climate mitigation. The market based system of global cap-and-trade system gives a built-in edge to high emitting industrial countries. Developed countries have now acquired significant experience with these mechanisms, and although the net result has not been to enable them to achieve their Kyoto targets, there remains considerable support for them in developed countries. However, once again, these mechanisms are silent insofar as the other principles of climate action are concerned. While these may prove to be relevant and useful in developed countries, they cannot be viewed as an important instrument as far as the development challenge in developing countries is concerned.

Adaptation

Rich countries provide the funding and technology needed to enable the poorest countries to adapt to the effects of climate change.

Financing for adaptation must be based on the 'polluter pays' principle – the countries with the highest historical carbon emissions should pay the most money to help the most vulnerable countries to adapt.

There is a clear need for both new and innovative governance structures for adaptation funding and new and innovative finance to pay for it. The developed countries must commit in principle to providing adaptation finance additional to the existing commitment to meet 0.7 ODA/GNI. The adaptation funding must be provided in the form of grants not loans so that recipient countries do not pay twice for the damage caused to them by rich countries' carbon emissions. The scale of additional finance needed for climate change adaptation by referencing UNFCCC estimate of $67 billion extra per year for developing countries or UNDP estimate of $86 billion extra per year.

The vulnerable countries must have a central voice in the governance of multilateral adaptation funds.

Financing

The first pertains to the need for financial resources, and the second to their potential supply. The UNFCCC estimates that additional financial resources will have to increase steadily, to a level $200-210 billion by 2030 in order to achieve the emissions reduction targets currently being discussed.

- *Renewable Energy Technologies*: Investment in infrastructure development that can provide incentives for a sustained shift to modern renewable technologies, including solar PV, wind, small hydro, geothermal, and biofuels.
- *CCS*: As already mentioned, investment in CCS to make zero carbon coal technology competitive in developing countries.
- *Technological Development Capacity*: Investment in institutions of research, education, extension, policy, credit, marketing, and inputs in all areas of relevance to climate mitigation and adaptation.
- *Energy Efficiency*: Support for incorporation of energy efficiency measures and policies, especially in building and urban planning, public transport infrastructure, and adoption of alternative lifestyles.
- *Forestry and Land Use*: Support for protection and expansion of forest cover and sustainable land use practices.

Technology

The main problem is that in the absence of rapid deployment of technological solutions, mitigation of climate change will require a massive decrease in living standards as well as the derailing of the growth momentum in developing countries.

Unless technologies are available at costs that make them competitive with conventional carbon-based technologies, and unless the economic actors (businesses, households, and government planners and regulators) in developing countries have efficacious access to these technologies, there would be no progress.

The negotiation process will, therefore, have to focus on such issues as the appropriate institutional modalities for technology transfer, the issue of IPRs and its implication for facilitating or obstructing climate action, financial resources to pay incremental costs, capacity building for local use and manufacture, access to technology, and technology assessment from the perspective of environmental, safety, and social safeguards.