IMPLICATION OF CLIMATE VULNERABILITY ON AGRICULTURE AND FOOD SECURITY IN SOUTH ASIA

IMPLICATION OF CLIMATE VULNERABILITY ON AGRICULTURE AND FOOD SECURITY IN SOUTH ASIA, SPECIALLY BANGLADESH CONTEXT AND SOCIAL HUMANITARIAN RESPONSIBILITY

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I. Introduction:

Bangladesh has made considerable progress in increasing food production as well as on its socio-economic indicators against MDG goals, yet it continues to be one of the poorest as well as food insecure countries in South Asia, due to income inequality, frequent disasters, and social complexities. According to UN Human Development Report 2007, Bangladesh is among the countries to be worst-affected by climate change that may cause a large-scale reversal in human development, breaking down the entire agricultural system of the country. Climate change has the potential to undermine development of countries like Bangladesh and vulnerabilities could be increased in day by day. The annual risk of flooding and flash floods increases food insecurity and vulnerability by limiting local livelihoods, inhibiting productivity of land, destroying household assets, and increasing isolation from markets and social services.

Within three pillars of food security: **availability**, **access** and **utilization**, there have been significant strides in improving the gross food availability, in particular through cereal self sufficiency and improvements in land productivity. However, food access and utilization continue to remain critically low, especially among the poorest and disaster affected. **Income inequality and chronic poverty**[1] are the primary causes for wide-spread food-insecurity About a third of the population is below the lower poverty line (consuming less than 1,805 kcal/capita/day) with seriously imbalanced diets and extremely inadequate intake of fats, protein and micronutrients. Almost 40 percent of under-5 children in rural Bangladesh are reported as stunted and 46 percent are reported as underweight, indicating that chronic under-nutrition is widespread.[2] Furthermore, there is an important **spatial dimension** to poverty and food insecurity creating disproportionate affects on people in disaster risk prone areas, such as char lands (river islands), **haors**[3] and coastal areas.

II. Implication of Climate Vulnerability

1. Securing world food security in light of the impact of climate change may be one of the biggest Challenges we face in this country. An estimated 850 million people in the world today suffer from hunger. Of those, about 820 million live in developing countries, the countries expected to be most affected by climate change. Projected population and socio-economic growth will double current food demand by 2050. To meet this challenges in developing countries, cereal yields need to increase by 40 percent, net irrigation water requirements by 40-50 percent, and 100-200 million ha additional land may be needed, largely in Asia, sub-Shahara Africa and latin America.

2. South Asia (as defined in this paper comprises eight countries; Afganistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Srilanka) faces key development challenges such as population growth, high incidence of poverty, urbanization and the degradation of the environment. Climate change could make this region more vulnerable and reverse country's efforts towards achieving MDGs by causing reduction in agricultural yields, increasing water stress due to changes in precipitation patterns and

[1] 49.6% people live in poverty (below US$ 1 per day)[1].
[2] Bangladesh in Facts and Figures: 2005 Annual Report of the Nutritional Surveillance Project, Hellen Keller International, 2005.
[3] A wetland ecosystem in northeaster Bangladesh that is a saucer shaped shallow depression in the land that is also known as a backswamp. The Haor is a remote and difficult area that is flooded every year during the monsoon. Some of the most extensive seasonally flooded areas in South Asia are located here.

glacier melting, decline in fishery products, degradation of natural grassland and impacts on forest products. South Asia lags on most human development goals, although it will likely meet the poverty reduction MDG. (World Bank, 2008)

3. The climate conditions, combined with socio-economic situations make south Asia, one of the most vulnerable regions in the world with regard to climate change. The climate of south Asia is characterized by extreme and natural hazards like cyclones, wind storms, droughts and heat waves, floods, glacial lake outburst flood (GLOS), land slides, pest and diseases outbreaks, etc. The assessments of the impacts of natural disasters revealed that south Asia accounts for almost 80% of the total population affected and 86% of total damage due to drought in Asia. Similarly, this sub-region account for 35% of the total population affected and 28% of the total damage due to floods in Asia (CRED 2007). Moreover, the productive sectors which include agricultural accounted for over half of associated damages and losses. Climate change will superimpose itself on these existing trends, significantly increasing production risk and rural vulnerability, particularly in regions that already suffer from poverty and hunger.

III. Current Agriculture Production and Food Security Status in South Asia

4. The majority of south Asian countries share similar economic and sustainable development challenges. The most prominent similarities are frequent occurrence and susceptibility to natural hazards, excessive dependence on agriculture, widespread poverty and vulnerability to climate change. Five out of eight countries in the region are characterized as least developed countries (LDC), and of these five LDSCs , three are land -locked least developed countries (LLDC) possessing low-income, weak human resource and economic vulnerability. The South Asia region contains a population of 1507.5 million (2007) and projections anticipate 1727 million by 2015. Agriculture represents a high share of GDP and approximately 150 million households, with 751 million people classified as agriculture dependent. Since 1990, millions more people are chronically hungry in Sub-Shahara Africa and Southern Asia, where half of the children under age 5 are malnourished (UN MDG's Report, 2005).

5. South Asia possesses diverse farming system ranging from intensive rice-wheat systems to spare arid regions and mountains. Large parts of the region face severe environmental constraints like erratic and uneven distribution of rainfall, water stress risk, low soil suitability, steep slopes and mountains, severe land degradation and low to medium climate production potential (Dixon et. al..2001). The area under arable land and permanent crops is estimated at 213 million ha (FAO, 2008) and expected to show only a marginal increase by 2030; the region's irrigated land area will grow from 85 million ha to about 95 million ha in 2030.

6. The current total food production in south Asia has increased 3 folds from 117 million tonnes in 1961 to 348 million tonnes in 2006 (FAO, 2008b), but the dietary energy consumption has increased only marginally. The current dietary energy consumption is 2364 kcal/person/day and expected to increase to 2790 by 2015 and 3040 by 2030. It requires additional efforts in yield improvement, given the fact that there is limited scope for expanding area under cultivation and area under irrigation.

7. South Asia is home to the largest concentration of poverty and undernourished population. FAO estimates that 312 million (21%) People are still undernourished (FAO, 2008c) and 26.4% of the population is below poverty line (ADB, 2008). Indicators of other dimensions of poverty, such as female illiteracy (59%), child mortality (89 per 1000 in children <5 years), and child malnutrition (51%) also point to extensive poverty. Nearly 40 percent of the world's poor earning less than a dollar a day live in the region.

IV. Climate Change and Its Implications for Agriculture and Food security in the Sub-Region

8. Changes in climate and other important environmental factors pose a major concern to food security in the region. This is because such changes not only directly threaten the production of food from land and sea for local consumption, but also threaten revenue generation at farm scale. The adverse impacts of climate change are a major barrier of food security and achievement of sustainable development goals in south Asia. They anticipated to exacerbate the impact of existing development challenges such as loss of market and declining value of traditional exports, declining domestic food production and increasing imports; and environmental degradation.

9. Arable land, water resources and biodiversity are already under pressure and are expected to be stressed by changes in precipitation patterns. With climate change, negative impacts on agriculture are predicated; coral reefs and mangroves will be threatened by increased sea surface temperatures, and sea-level rise. Predicted impacts of climate change in the region include extended inundation of arable land, salinity intrusion and reduced fresh water availability. For example, in India freshwater availability is predicated to decrease 47% in 2025 due to climate change and population growth.

10. Semi-arid tropics are vulnerable due to reduced rainfall and increased evapotranspiration and drought (e.g. central and peninsular India; Sindh and Balochistan of Pakistan; North West Bangladesh), While small islands are extremely vulnerable due to high exposure population and agricultural infrastructure to sea level rise (e.g Maldives) and increased storm surge. The Magna basin and north eastern Haor region of Bangladesh is vulnerable to flash floods.

11. Extreme weather events can be very damaging to fisheries industry, hitting fishing gear, fishing vessels, but also coral reefs, mangroves and coastal vegetation, which act as protective barriers for the coastlines. The unprecedented increase in the movement of people, animals and goods, multiplies the pathways for the dissemination of transboundary animal diseases and plant pests (including insects, pathogens and plants pests) and aquatic species. Once introduced, climate change combined with change in crops, landscapes and human activities may create favorable ecological conditions for the persistence of transboundary diseases and pests.

Initiatives on Climate Change Adaptation and Mitigation in the Agriculture Sector

12. The Priority actions to protect local food supplies, assets and livelihoods against the effects of increasing weather and extreme events are: a) Vulnerability and risk analysis and risk management specific to agricultural eco-system, b) Crop varieties and breeds adapted to changing climate conditions, c) introducing alternatives to provide food, fodder and energy and enhance cash incomes, d) promotion of insurance and relocation of vulnerable assets, and e) rain water harvesting and water storage.

13. The priority actions to avoid disruptions or decline in food supplies due to changes in temperature and precipitation are a) efficient agricultural water management and drainage, b) adjustment of planting and harvesting schedules, c) floating agricultural system for flooding, risk diversification in drought prone areas, d) improving weather / climate and flood forecasting and warning and e) improved livestock management, altered grazing and rotation of pasture.

14. The eco-system management through provision of environmental services need to be ensured by a) use of degraded / marginal lands for productive planted forests or biomass for alternatives fuels, b) watershed management and prevention of land degradation, c) regulation through planning legislation and zoning, d) protection of coastal areas from cyclones and other coastal hazards, e) forest fire management through altered stand layout, f) preservation of mangroves and their contribution to coastal fisheries, and g) biodiversity conservation.

15. FAO promotes options for climate change mitigation in the food and agriculture sectors by reducing emissions without compromising food security. Sustainable land management practices can diminish the conservation from forested area to cultivated or grazing land, increase the efficiency of water, soil and energy use and at the same time reduce emissions from deforestation, forest degradation (REDD), cropland and pastures. For example, Bhutan has 72.5% of its total land area under forest cover and high per capita GHG sequestration potential.

16. In agriculture, reducing methane emissions from ruminant livestock, rice paddies, manure and nitrous oxide emissions from soil attention. Carbon sequestration in biomass and soils can be enhanced by a) sustainable forest management, b) reforestation and afforestation, c) rehabilitation and restoration, of degraded grassland, rehabilitating and restoration of cultivated organic soils, e) promoting conservation agriculture, f) grazing land management and g) residue retention and conservation tillage system.

V. Experiences Gained and Lessons Learned

17. FAO is implementing programmes and projects in the region on climate change adaptation at multiple level of targeting agriculture sector. The experience clearly shows that the climate change impacts exacerbate existing vulnerabilities; adaptation must be addressed in the boarder context of vulnerability. Addressing current climate change adaptation risks is suitable operational entry point to lunch climate

change adaptation. Adaptation is considered as social learning process and needs to involve institutions and multiple actors within the agriculture sector and other relevant sectors.

18. Awareness raising and institutional capacity building are the key. Adaptation is location specific, requires demand-driven research and extension strategies for technology development and transfer. Cross-sectoral livelihoods perspectives with strengthened institutional systems are essential to capture farmers' needs and to respond to location specific demands.

19. Improve operational linkage between climate change adaptation, disaster risk management and development are needed. Re-strengthening agriculture research (action oriented), extension services and development links are essential for continuous adaptation. Synergies between climate change adaptation and mitigation exist and need to be exploited.

20. Response to climate change need to be coordinated and integrated within existing policies of socio-economic development and environmental conservation to facilitate sustainable development.

21. Re-orientation of water resource management to take care of the impacts of climate change is very much needed as south Asia's food production depends heavily on fresh water resources including ground water. National agriculture ministers, Agricultural Research systems Universities, FAO, and several other development agencies have promoted innovative approaches of water management, and key issues still need to be addressed, such as i) reform of irrigation agencies, ii) modernization of irrigation systems, iii) changes in water governance, iv) river basin management and v) water policy related to agriculture sector aiming to meet food security in the region.

22. Community level actions to demonstrate viable adaptation options in the drought -prone areas of Bangladesh improved the adaptive capacity of the marginal farmers and poor people against climate risks and helped to accelerate adaptation processes. The Farmers field school approach promoted by FAO and Danida provide excellent opportunities for integrating climate risk management strategies and practices into the FFS modules. The Others international development agencies promoted Community Risk Assessment (CRA), Community based early warning system, community disaster preparedness planning, strengthening & more functioning local level disaster management committee and school based disaster risk reduction planning.

VI) Knowledge Gaps, Opportunities and Key Messages

22. Adoption of risk management practices and policies for hazard vulnerability reduction help South Asian countries in preparing better for climate change impacts. Risk transfer could occur through micro-insurance, catastrophe bonds and reduced insurance premiums as an incentive to talk preventive measures. However, the lack of financial mechanisms acts as an obstacle to insurance initiatives.

23. Policy formulation needs to be build upon an improved understanding of the links between climate change and food provision, while promoting socio-economic development and limiting further environmental degradation. Given the magnitude of the impacts of climate change, a comprehensive climate strategy for the region needs to focus on adaptation as a first priority. Mitigation activities such as soil carbon sequestration, ecosystem restoration, protecting mangroves in coastal areas and reduced emission from deforestation and forest degradation promotes ecosystem resilience and improves adaptive capacity of the communities against climate risk.

24. The diversity of experience in the region provides an opportunity to upscale climate change adaptation and mitigation initiatives. Collaboration between countries in the sub-region in developing regional and national policies, legislation for sustainable development and institutional mechanisms would provide a common platform for sharing of information, technologies and capacity buildings.

25. The Government of Bangladesh recognized the need for the regional collaboration and requested the development partners to assist in establishing an International Center for Adaptation in Bangladesh which will provide a forum to study aspects of the vulnerability of countries to climate change, scope and constraints to adaptation, develop relevant databases, and provide a network among countries and professionals.

VII. Climate Issue in Bangladesh context and Social Humanitarian Responsibility: Case study

1. Qualitative data collection included some exploratory questions around climate change. Community members reported increased temperatures, more extreme storms, irregular flash floods and irregular/infrequent rainfall. They inferred multiple linkages between these changing weather-related characteristics and livelihood impacts such as reduced crop and fishing yields, less migratory birds, increased insect infestation and crop disease, and reduced soil fertility. On e common example mentioned was that climate variability has reduced ability to predict flash flood; previously crops could be harvested prior to flash flood. (Bangladesh Food Security for the Ultra Poor Project Baseline report, 2010)

It was noted that in the last ten years the water levels of the Haor have been reduced significantly and sedimentation has increased; Beels and marshlands were filling up, which negatively affected fishery and agricultural practices due to lack of water in the dry season. In addition, the increased irrigation required as a result of the reduced rainfall and lower water levels make agricultural practices more costly; reducing profits derived from agriculture.

As a result of these changes, many poor and ultra poor households can no longer rely on daily fishing labor as the main source of income but must now do agricultural day labor and poultry rearing to make a living. Overall, community members noted limited capacity to adapt to these changes, particularly for the ultra poor.

In addition, community members highlighted man-made problems that compound the problems considered to be caused by climate variability. For example, the use of insecticides on crop land has reduced fishing yields and has also decreased day labor opportunities for pulling weeds.

To address the impacts of climate change, community members stated the need to organize development activities that focus on river dredging, promotion of more resilient crops and agricultural practices, and provision of training on climate change and how to adapt.

2. The Haor Region of Northwest Bangladesh has faced a serious ill-timed flood started in the last week of March 2010. The early flooding caused by the heavy rain downpour and rolling of water from the hills across the border in India destroyed the unripe boro paddy (Main seasonal crop) and collapsed the roads and embankments across the haor region. The lives and livelihoods of the mass population - both landed farmers and landless day laborers - are largely influenced on the harvest of the boro paddy, which, in most cases fully damaged ahead of 1-2 months of harvest. Different government sources, media reports and the adult villagers termed the flood as a different type of flood in terms of nature and timing, which is never been seen before. They claimed it as a severe consequence of climate changes.

The most vulnerable households in the most vulnerable communities, who are the worst affected by the early flood due to their vulnerable living locations.

FSUP-H has conducted a rapid appraisal to identify the affected impact population with types of losses/damages. The report presents the findings of the assessments along with key relevant features published in the national dailies.

Key features of losses/damages

- About 50% of the impact households depend on selling agriculture labor as their primary occupations. They received paddy as payments in kind as contract portions in paddy harvesting season by selling their labour. A typical day laboring households in the haor region usually receive 10-12 mounds (40 Kilograms =1 Mound) of paddy during each harvest season, by which they can secure food security of 4-5 months for their households members. The recent floods diminish the food security level significantly.

- The impact households started coping the situation with adjusting meals. Even they have reduced both quantity and quality of intakes. Now they are eating more dry fish and chili with rice.

- As the haor region is a single crop (paddy) area, the crisis will be more acute from July onwards.

- As about 50% of the impact households have lost their work opportunity in the paddy harvest season, many of them already migrated to other rural and urban areas to seek an employment.

- About 70% are remained unemployed; some have started fishing, although catches are not enough.

- About 30% households reported that their latrines are washed out and tendency of open defecation increased.
- Members of affected households have started suffering from different diseases like diarrhoea, skin diseases, fever, etc.
- Different waterborne diseases are increasing due to fragile sanitary latrines.
- Health expenditure increased at household level
- Supplies of vegetables are limited and are costly.

Conclusion:

Compensation like financing in climate change is a critical issue discussed at the global negotiation. Describing the forthcoming climate impacts to the Bangladesh, Prime Minister of Bangladesh in her address at the Copenhagen Climate Summit (COP 15) in December 2009 stressed a common commitment to meet the emergency needs of millions of household whose lives are endangered by increasing natural disasters, erosion of riverbanks and salinisation of rivers and Copenhagen Accord of Commitment were developed. In the next, the Cancun Agreement enshrined the Copenhagen Accord commitment to a new Green Climate Fund with an interim Fast Start Funding (FSF) package which reaffirmed the commitment from developed countries mobilize $100 billion of climate finance a year by 2020 to address the adaptation needs of developing countries.

Financing of a sustainable climate deal is still a vision, not a reality, although pieces of the future package are now in place. The emerging structure is being framed from the global level. The global policy leaders are generating knowledge about context of country level for its future development which will be scrutinized under Monitoring, Reporting and Verification requirements. We should keep it mind carefully to overcome the **policy and diplomacy of climate entrepreneurs** particularly of rich countries.

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