



BUILDING RESILIENT FUTURE

Bangladesh Reducing Disaster Risks
in Changing Climate

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Comprehensive Disaster Management Programme
Ministry of Disaster Management and Relief



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Comprehensive Disaster Management Programme (CDMP II)
Disaster Management and Relief Division
Ministry of Food and Disaster Management

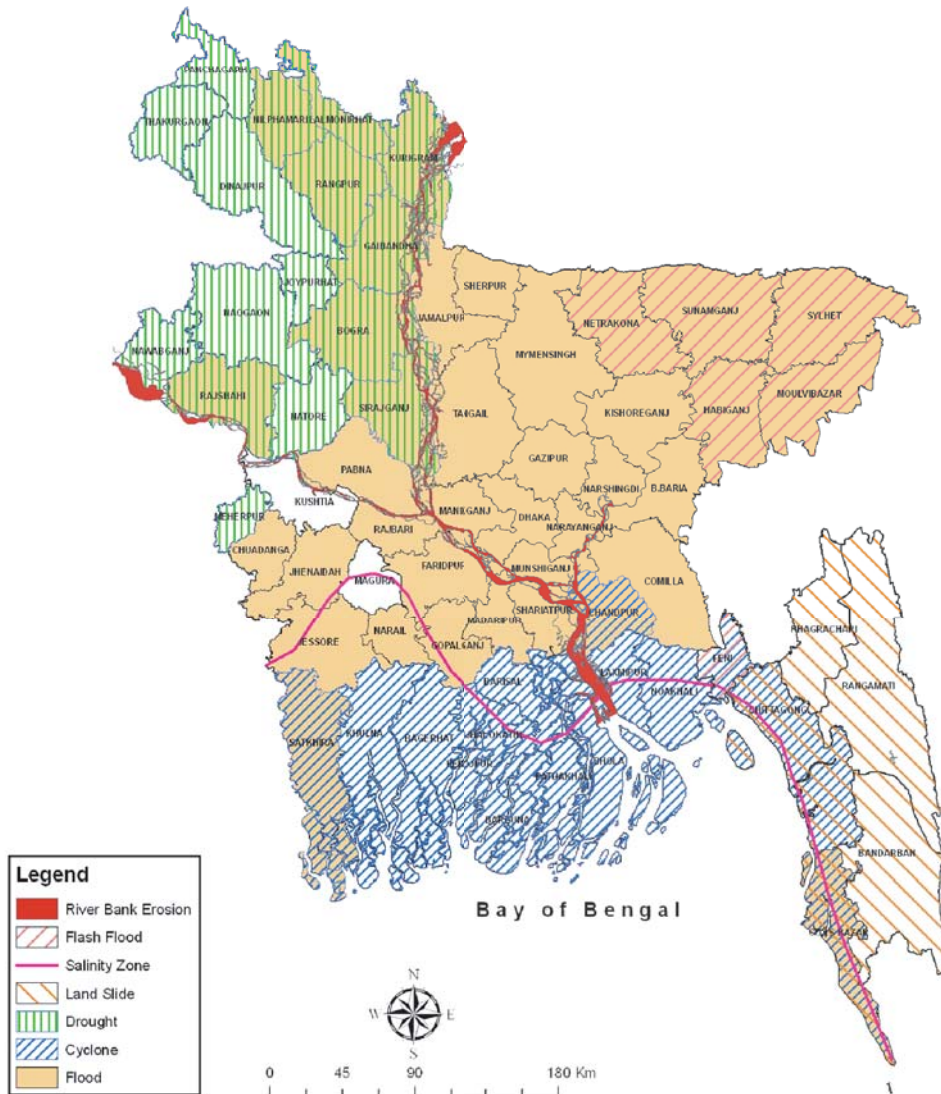


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Bangladesh map showing different hazard risks



DMIC, COMEP, Dhaka, 14.10.2010



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Climate Change and Disaster Challenges in Bangladesh

Climate change has emerged as the greatest threat to humankind. The long term effects of climate change are likely to hinder the progress towards sustainable development and undermine the development gains. Climate change will have negative impact on all aspect of human development including livelihoods, food security, safe water and sanitation, health care, shelter etc. Poor communities of developing countries will be pushed further into extreme vulnerable condition and suffer the most in the face of increased intensity and frequency of disasters.

Bangladesh is one of the most vulnerable countries who are facing immense challenge due to climate change. Geophysical position coupled with highly dense population, limited resources and dependence to nature make Bangladesh a hazard prone country with many subsequent catastrophic events like flood, cyclone and salinity intrusion. The poor are the most affected by the climate extremes and have very little capacity to cope with the risks.

Bangladesh is already experiencing the impacts of climate change through irregular rainfall pattern, floods, flash flood, cyclone, saline intrusion, drought, sea level rise, tidal surge and water logging. Poor communities in the coastal areas of Bangladesh are the most vulnerable to the impacts of climate change and extreme climatic events with environmental degradation. The north western part of Bangladesh is experiencing successive drought and acute water shortage, pushing agriculture dependent communities further into poverty. In the central zone and north east, increased and prolonged flood, flash flood and river erosion are causing unprecedented loss of

Bangladesh - innocent victims of global warming

Bangladesh has one of the lowest per capita emissions in the world. Yet a majority of its people, the economy and ecological space has already suffering due to global warming for which developed countries are primarily responsible. For Bangladesh global warming induced climate change will -

Threaten Development- *Climate change and global warming triggers a host of effects with far reaching consequences for the already vulnerable nation and its people.*

Challenge poverty reduction - *Past achievements, current efforts to break out of the poverty trap and pursue sustainable development aspirations are already confronted with climatic challenges.*

Question human security - *Permanent displacement from homes, settlements leading to out-migration has already led to a surge in squatters and slum dwellers who are physically, financially, psychologically and socially insecure. The rate of out-migration due to flood, river erosion, coastal erosion, permanent inundation already is alarming and holds the potential for development instability.*

livelihood and assets.

Two devastating cyclones, Cyclone Sidr in November 2007 and Cyclone Aila in May 2009 that hit the coast of Bangladesh gave a glimpse of the challenges wait for the country in the near future. While the loss of lives during these cyclones was reduced, the destruction to infrastructures, eco system and livelihood would take many years to recover, making the long term impact of climate change visible with declining living condition of the coastal communities.

Hundreds of thousands of the coastal impoverished communities have already been displaced and pushed into extreme poverty without any livelihood opportunity and shelter. Millions more will follow if the sea level rise and saline water intrusion continues to move upward in the inland. A 45cm rise of the sea level will not only affect the vast coastal ecosystems and hamper agriculture and food production, has the potential to dislocate about 35 million people from 20 coastal districts. The climate induced displacement will create new housing, livelihood and settlement challenges as well as enhance competition and conflict over scarce resources including land, water, fisheries and forests. Rural to urban as well as cross boarder migration will accelerated with the continued increase climate induces displacement forcing people live in inhuman and undignified living condition in the slums without adequate income, food, water, shelters and basic amenities.

Confronting the Challenges of Climate Change

Disaster Risk Reduction (DRR) is the development and application of policies and practices that minimizes risks to vulnerabilities and disasters. While Climate Change Adaptation (CCA) is an adjustment in natural and human systems, which occurs in response to actual or expected climate changes or their effects. Governments worldwide have recognized that disaster risk reduction is a fundamental building block of any climate change adaptation action plan or strategy. The world agrees that more Integration and convergence of disaster risk reduction and climate change adaptation into development plans and poverty reduction programmes.

Global warming induced climate variability and change is already evident in Bangladesh and many poor and vulnerable communities are at risk from adverse impacts. As a country striving to achieve the Millennium Development Goals ((MDG), Bangladesh continued its efforts to fulfill its commitment to Hyogo Framework for Action (HFA) for sustainable development. Bangladesh also has demonstrated its ability to withstand disaster and climate risk by combining indigenous knowledge and practices with the spirit of endurance and perseverance of the affected population.

In Bangladesh

Disaster risk reduction and climate change adaptation is now an integral part of national development strategy.

New legal and institutional frameworks for disaster risk reduction and climate change adaptation have been established.

Disaster and climate change sensitive sectoral development strategies, norms and standards (e.g. urban development, water management, natural resource management, and infrastructure) are also adopted.

Social safety net programs have been strengthened for building resilience to cope with disasters and anticipated climate impacts in Bangladesh.

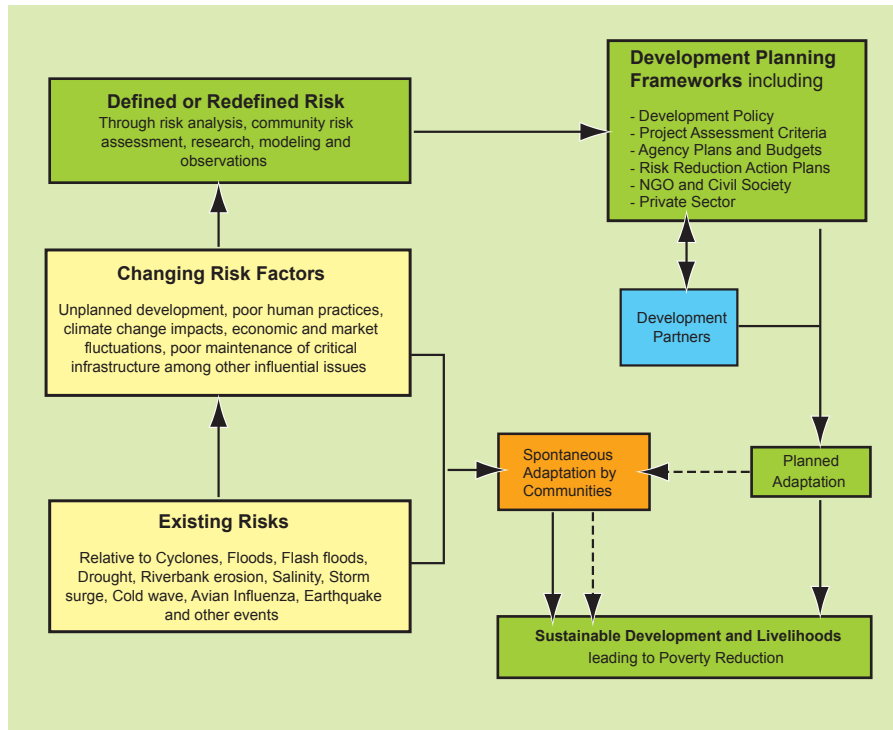
Cooperation and collaboration in disaster risk reduction and climate change adaptation have been strengthen among government and non-government actors in the areas of land use planning, city emergency management, early warning dissemination, community-based disaster preparedness, etc.

Post-disaster needs assessments are undertaken in the aftermath of a disaster to accelerate resilient recovery.

National Strategy Disaster Risk Reduction and Climate Change Adaptation

Government of Bangladesh aims to create an enabling environment that empower communities and ensure appropriate resources to protect lives, livelihoods and its development and poverty reduction investments. The country is

- Developing and implementing overall framework, effective approach and institutions to facilitate climate change adaptation across sectors for "Disaster and climate change proofing of development plans"
- Facilitating sustainable livelihood approaches and options at regions vulnerable to climate variability and extreme events
- Promoting activities, generating knowledge, and translating scientific information both for policy making and exploring appropriate technological options
- Documenting community level adaptation for national planning and international negotiations as well as enhancing public awareness on the convergence of DRR and CCA



Comprehensive Disaster Management Framework - Bangladesh

Adhering to the Bali Action plan, Bangladesh is working for a pro-poor, climate resilient future through National Adaption Plan of Action (NAPA), an integral part of national development policies, plans and programmes for achieving sustainable growth in (1) Food security, social protection and health; (2) Comprehensive disaster management; (3) Infrastructure development; (4) Research and knowledge management; (5) Mitigation and low-carbon development; and (6) Capacity building and institutional development. At the policy level the instruments that embody the integration i.e. the National Plan on Disaster Management (NPDM) and the Bangladesh Climate Change Strategy and Action Plan (BCCSAP). These two instruments jointly pursues and strengthens the Comprehensive Disaster Management systems, improving the capacity of government, civil society partners and communities to manage natural disasters, and ensuring appropriate policies and regulations for community-based adaptation programmes in vulnerable areas of the country.

Understanding Development Risks following Disaster and Climate Change linkages

Disasters and Climate Change are both development risks. There is a clear urgency to recognize the growing threat from these risks on achieving our national vision, goals and targets for sustainable development in the decades ahead, and take necessary measures to address and manage these development risks in the mainstream processes.

Climate Change is an issue that cuts across a large number of sectors, actors and institutions. To determine adaptation needs in order to plan adaptation actions, it is crucial that we start from the country's "business as usual" development goals, plans and targets, and also its vulnerability to natural phenomena, hazards and extreme events particularly those which are climate induced.

Defining and redefining the risks through risk analysis, community risk assessment, research, modeling and observations inform development planning frameworks including development policy, project assessment criteria, agency plans and budgets, risk reduction action plans.

The Comprehensive Disaster Management Framework guides disaster risks as well as adaptation to climate change impacts into development planning accordingly, and enable livelihood and development toward resilience.





Towards Disaster and Climate Change Resilience

Even with its scarce resources and increased challenges, Bangladesh has travelled a long way in reducing risk of its people and community. People of Bangladesh have shown incredible courage and steadfast determination in combating the impact of disaster and climate change. From each disaster, the country bounced back with renewed optimism, harnessing the unwavering spirit of the people, learning from the past and better preparing for the future.

With the vision of a nation capable of ensuring safe lives and livelihood of its people, the country was able to shift from a culture of relief and response to more comprehensive Disaster Risk Reduction. In the vigorous pursuit for resilience, disaster risk reduction and climate change adaptation become integral part of Poverty Reduction Strategy and its attempt to achieve Millennium Development Goals. The country has incorporated disaster risk reduction with its social safety net and food security measures to protect millions of the most vulnerable women, children, and men of our country. Political commitment and long term strategic planning moved the nation towards sustainable development by reducing risk of families and communities.

However, the challenges for disaster risk reduction and climate change adaptation also remain formidable and are increasing in intensity and complexity - some are persistent and recurring and the others are emerging. Overcoming these challenges will require scaling up our efforts through cooperation and collaboration among nations and communities - exchanging knowledge, information and technology for a common vision of a resilient future.

Upholding the spirit and vision for disaster risk reduction and climate change adaptation, Bangladesh has embraced a holistic process to integrate disaster and climate risks into development planning and processes. Many aspects of climate change and variability are already having a profound effect on the livelihoods of poor rural communities and enough is known about the future impacts of climate change for action to be taken. Bangladesh is considering the following options to mainstream disaster risk reduction and climate change adaptation, and this is taking place at different levels:

- **National Level** - Climate risk is now considered in the development planning. When an extreme event hits, it wipes out a sizeable portion of the GDP and in many developing countries extreme climatic events make poverty situation worse. By examining annual budgets carefully whether planned expenditures will increase exposure to the impacts of climate change, national governments can minimize their financial risk, promote macroeconomic stability, set aside sufficient funds to manage the consequences of climate shocks, and provide support for adaptation activities at the local and sectoral level.
- **Local level** - Local strategies for preparing for and responding to the anticipated impacts of climate change are being built into municipal/upazila/union planning processes and community level strategies, covering risk assessment practices, seed banks, community social services, and emergency preparedness programmes.
- **Sectoral level** -The impacts of climate change will be felt across a range of sectors, including human health, urban planning, agriculture, water, forestry, fisheries, coastal resources, transportation and disaster risk reduction. Consideration of these impacts is being built into sectoral planning processes such as infrastructure design and maintenance codes and standards.

Mainstreaming Disaster Risk Reduction and Adaptation to Climate Change

The vulnerability of the poorest and marginalized to climate change is a central challenge. Country's disaster risk reduction and climate change adaptation must focus on poverty relief through diversifying livelihoods and extension support for sustainable systems. Some of the measures and actions already practiced in Bangladesh are presented here:

To address central government impact:

- All government departments acknowledge the importance of climate change and analyze the impacts for their sector. Disaster planning and risk reduction strategies are taking account of the new challenges of climate induced disasters.
- Government is targeting support toward local government for appropriate adaptation activities can be planned for specific sectors and locality. National level activities are planning to support the distribution of resources and extension services to the local level, training and awareness-raising in communities, research for technology generation, information provision, and take forward international lobbying.

To address coastal and river zones impacts:

- Policy makers have started planning on how to protect the infrastructure and settlements of the rural poor in the region of the Ganges-Brahmaputra-Meghna mega delta and identify whether mass migration can be avoided.
- The government also is preparing to assess the implications of Sea Level Rise on the coast to be prepared for in the areas government is responsible for (e.g., agriculture, trade, population planning, disaster preparedness, the environment and finance, etc.)
- Government is exploring methods for construction of embankments to protect communities from saline water intrusion and tidal surge. Communities are being involved in routine maintenance of embankments. In addition, support is being given to farmers to cultivate saline tolerant paddy.

To address agricultural and fishery policy and extension support impacts:

- Government is providing support to farmers in their use of alternative technologies in the agriculture sector.
- Strategies such as adjustments to the cropping calendar, flood tolerant paddy cultivation, plus alternative crops, technologies, fisheries and livestock that are resilient to climate change (and higher winter temperatures in particular) are being promoted.

To address health impacts:

- Specific health and sanitation measures are being piloted and expanded complimenting alternative livelihood strategies.
- The impact of the government's sanitation for all by the year 2011 initiative is being maximized through creating mass awareness in the communities. Existing community clinics are fully operationalized and necessary logistical support is being ensured to meet the challenges that climate change presents.



Disaster Risk Reduction and Climate Change Adaptation in Practice



Comprehensive Disaster Management Programme (CDMP)

Comprehensive Disaster Management Programme (CDMP) was launched under the Disaster Management and Relief Division (DMRD) of the Ministry of Food and Disaster Management to institutionalize comprehensive disaster risk reduction approach. In its first phase (2004 - 2009), CDMP successfully laid the foundation, shifting paradigm from relief to response through introducing regulatory framework, incorporating disaster risk reduction in formal educational curricula and development planning system and pioneered innovative tools such as Community Risk Assessment, Risk Reduction Action Plan and Local Risk Reduction Funds, mainstreaming the Disaster Management System and strengthening community institutional support.

Based on the success and lesson from phase I, CDMP (Phase II) is working to strengthen the national capacity for disaster management to reduce risk and improve response and recovery through comprehensive approach. It aims to invest more on policies and knowledge building; work with and through the government and the disaster management committees; to reach the most vulnerable section of the population and to integrate the climate change adaptation in disaster risk reduction initiatives.

CDMP II is striving toward improving linkages with, and synergies between, disaster risk reduction and adaptation to climate change. Besides working with 15 ministries and departments for integration of DRR and CCA into their development planning, it has channeled significant resources for the piloting and scaling up various Community Based DRR and CCA interventions. Partnering with Local Disaster Management Committees, Community Based Organizations and NGOs, significant stride has been made in building community resilience to disaster and climate change risk.

Reducing Risks and Building Resilience at Community level

Integrating Disaster Risk Reduction and Climate Change Adaptation at the Local Level

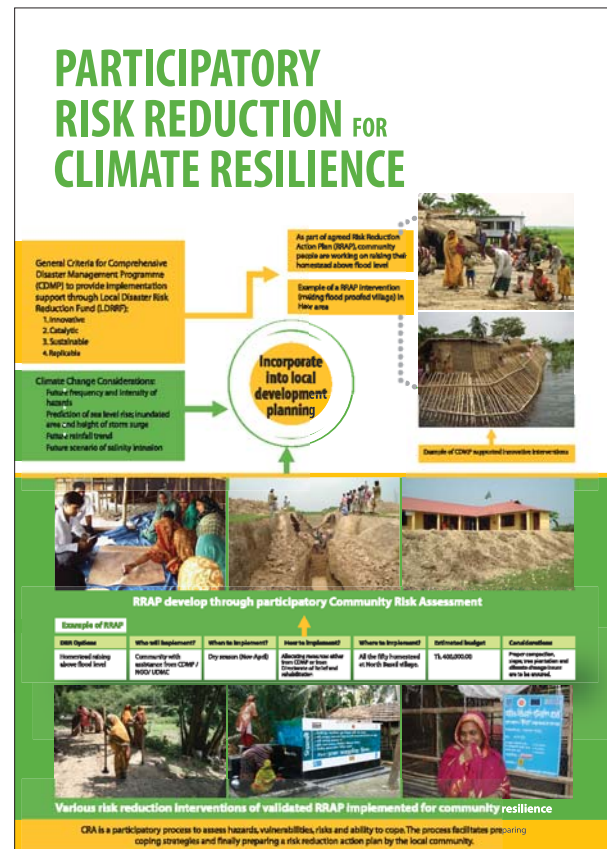
Climate induced hazards will have a significant impact on Bangladesh's rural poor. The impacts will force profound lifestyle changes and destroy livelihoods if communities are not made aware of climate change and supported in finding ways to adjust through community based adaptation. Community based adaptation emphasizes the need for communities to understand the shift in climate variation including temperature and rainfall.

- Awareness of climate change and active participation of the communities is a key pillar of community based adaptation
- Adaptation activities must have immediately impact and support building resilience for the future with diversified livelihoods, income generation, or better infrastructure.
- Adaptation in disaster risk reduction and livelihoods will help to address key climate vulnerabilities and build capacity to deal with future challenges.

The institutional entry point for the integration at the local level is through Disaster Management Committees (DMC), present at every administrative tiers, comprising of elected officials, community members, NGOs and government officials. Empowered by the Standing Order on Disasters (SoD) these DMCs are responsible for assessing hazards and coping capacity of the communities as well as developing plan for resources allocation for risk reduction for different sectors including health, education, agriculture, water resources management etc.

Community Risk Assessment (CRA) is a participatory tool for assessing the risk at community level. It looks at the socio-economic condition, physical conditions, as well as environmental setting that contribute to the risk. Based on this assessment a multiyear Risk Reduction Action Plan (RRAP) is developed consisting the identified priority interventions including disaster prevention/mitigation, preparedness and climate change adaptation measures. This local level action plan helps the community themselves, the local government as well as NGOs to invest in the needed areas and sectors

Most of the recommendations are likely to be undertaken by the community themselves, the rest are to be referred to the local development planning processes and the other to be funded by NGOs and other sources. For the last five years and will continue to 2014, some small to medium scale interventions that have innovative, catalytic and problem solving are financed through the Local Disaster Risk Reduction Fund (LDRRF).





Case Study

Comprehensive Approach to Disaster Resilience of a Flood Affected Community

Nearly 15 kilometer north of the Upazila headquarters, Bagbati is one of the eleven unions of Sirajganj Sadar upazila under Sirajganj district. Consisting of 31 villages inhabited by 10,522 families, this union covers nearly 10.75 square kilometer of area. According to the 2001 Census, total population is 51,503, of which 27,170 are male and 24,432 are female. Displaced by river erosion, additional 1500 women, men and children are living in Bagbati Union form surrounding areas.

Bagbati Union is part of the vast plane of Northern Bangladesh that faces reoccurring floods during monsoon seasons. Residents of this union experienced devastating floods in 1988, 1998 and 2004 due to the failure of flood protection dam surrounding the area. Most of the houses were under the water during these floods, forcing people to live in flood shelters for months. Flood water also submerged most of the agricultural fields damaging crops severe loss t livelihoods of the poor communities. Community infrastructure and grazing land for livestock were also inundated during these floods, causing severe interruptions to regular life of these island communities

With the support from Comprehensive Disaster Management Programme (CDMP) the Bagbati Union DMC conducted the CRA. The assessment identified Ghora Chara Village as one of the most vulnerable community in the union and proposed a set of immediate risk reduction interventions at the community level. In collaboration of the community the proposed interventions was implemented in February-April 2008.

Infrastructure Development

The community proposed to raise the homestead of the most vulnerable households in village above the highest flood level. Men and women were involved form the community to assist the households for raising their plinths. With the support of the community, 30 most vulnerable household were able to raise their homestead in the village.

Water Sanitation

In order to solve the acute shortage of safe drinking water, the RRAP proposed to install tube wells in various points of the village. Six (6) tube wells for drinking water with cemented platform were installed with the consultation of the community. In addition, 30 flood proof sanitary latrines were installed for vulnerable families.

Livelihood

Each household received 5 saplings of fruit and timber bearing trees for plantation and vegetable seeds for homestead gardening. Support was also extended for bamboo fencing of the gardens. Each family also received 10 chicken and 5 duck with shed. One member from the family, usually women received training on homestead gardening and poultry & duck rearing. Alternative livelihood options increased household income and provided more resources for protect household assets from disasters. Produce from these livelihood interventions also contributed in meeting daily nutritional needs of the households.

Reducing Risks and Building Resilience at Community level

Climate Resilient habitat - Building Resilience of Coastal Communities

South Western Coastal region of Bangladesh, with nearly 35 million and highest concentration of extreme poor, are the most vulnerable to climate change. Dependence to nature forced many to live in remote areas and make them susceptible to reoccurring disaster. With each disasters people these vulnerable communities continue to lose their coping capacity. Disaster and Climate change impacts are destroying infrastructures, creating challenges for livelihood, increasing health risk and forcing thousands to leave their homes to safe areas.

However, migration of this huge population is unrealistic and will result in increasing sufferings. Breaking this vicious circle requires work beyond the traditional ways of responding through disperse infrastructural, livelihood and service delivery intervention. It requires addressing the causes of vulnerability and assist the entire community to engage in comprehensive interventions that will not only ensure the protection of the settlement but also provide self-sustaining livelihood and service delivery option for its population. Community based disaster preparedness and mitigation must be integrated with capacity building of communities for everlasting change.

CLIMATE RESILIENT HABITAT

Resilient Habitat is a community-managed disaster mitigation approach with comprehensive risk reduction and adaptation interventions that can reduce vulnerability and can provide more secured and dignified living for the coastal poor. This cost effective and alternative approach strives towards a sustainable solution. The Resilient Habitat engages technology, physical and social infrastructure, local knowledge and social capital to complement the available resources to promote resilience through better living. And thus in the event of major disasters, the at-risk communities avert themselves from mass displacement, destruction of assets, and the expensive rehabilitation or reconstruction afterwards. With the price of one cyclone shelter, the Resilient Habitat helps fortify and concurrently uplift the living conditions of a larger number of the most vulnerable communities.

Comprehensive Disaster Management Programme (CDMP II) is piloting the "Climate Resilient Habitat" in Bainpara and Gazipara, two cyclone affected villages of Sutarkhali Union under Dacope Upazila in Khulna District. Success and lessons from this pilot intervention will help build communities in south western part of Bangladesh that can with stand reoccurring disasters, fight back climate change impacts and achieve sustainable growth. Majority of the community is internally displaced people, asset-less coastal poor without livelihood options due to reoccurring disaster and climate change.



THE SALIENT FEATURES:

Structural Safety: Habitat will build cyclone and salinity resistant housing based on 100 years tidal surge data that can withstand 215 KM/per hour wind gust to minimize infrastructural vulnerabilities. A second tire of embankment will be built to protect the community and agricultural land from tidal surge and saline intrusion. Plinths of community structures and households will be raised above normal flood level to protect lives and assets.

Sustainable Livelihood: Alternative and diversified livelihood options will be introduced for the community to ensure climate resilience of the households. There will have a common grazing field in each of settlements as livestock raising is one of the main livelihood options of the coastal hardcore poor. Besides, there may be medium and mini size dairy farm, pond for aquaculture, backyard farm, and common production center like handloom, tailoring, handicrafts, bakery, kitchen garden etc.

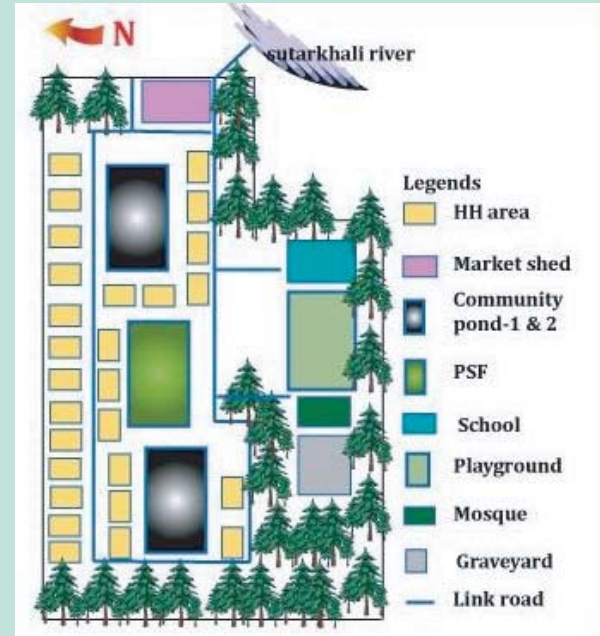
Adaptation Interventions: The climate resilient habitat will promote the development of small scale renewable energy sources such as solar panel and bio gas plant to meet the household energy need. Besides developing ground water sources, the habitat will pilot innovative ways of ensuring safe water including rain water harvesting tanks and solar power desalination panel.

Natural Ecosystem Management: Wind breaking tree plantation will encompass the entire habitat for protection during cyclone. It will also build sustainable mechanism for precious resources such as land and water. Awareness raising and capacity development interventions will be initiated to protect flood plains, wetlands, and forest.

Social Protection: Special attention will be given for the protection of marginalized and most vulnerable groups. Within the settlement, specific programmes will be launched for increased service delivery including children's school program, health care services and women empowerment etc. It will invest greatly in developing social infrastructures like schools, health care center, mosque and other religious institutions, community centers, common recreational facilities etc.

Early Warning: It will create communities own early warning mechanism for gathering and disseminating disaster and climate change related information. End to end early warning will rely on community volunteers, available telecommunication transmission. The community will also engage in awareness rising campaign for behavioral change.

Community-managed: The initiative will be implemented through highly participatory approach that rely on traditional technology and indigenous knowledge as well as modern ones. Self-government bodies such as Project Implementation Committees and Community Based Organizations for occupational group regularly meet and provide inputs for the interventions. Community based organizations will be responsible for continuing the management of the habitat to ensure sustainability.



Reducing Risks and Building Resilience at Community level

Diverse Livelihoods Adaptation for Reducing Climate Change Risk

Bangladesh is in the top of the list of most disaster affected countries and over 90% of the disasters are climate induced. Realizing the country's current and future risks and vulnerability, the government working towards improving community based adaptation option through innovative piloting. Stressing the need for agricultural adaptation to climate change for livelihood and flood security as prescribed in NAPA, through the Comprehensive Disaster Management Programme (CDMP) piloting various crops production to offset the negative impact of climate change.

Livelihood Adaptation to Climate Change in Agriculture (LACC) was initiate with the cooperation of FAO and the Department of Agricultural Extension, to apply scientific findings into sustainable livelihood options. The Project facilitated the identification, testing and replication of adaption options to support the vulnerable communities. The project supported the strengthening of Farmer's Climate Schools for learning and dissemination of collected scientific information on climate variability.

Initially, the project tested different livelihood adaptation options in 2 drought prone districts of North West Bangladesh. Later, it expanded to other hazard prone areas in the coastal belt and widened the focus from crops and livestock to include bio-energy, fisheries and forestry. A comprehensive 'Adaptation Option Menu' was complemented by detailed technical guidelines for each technology option and was being regularly reviewed and updated through expert validations.

The Project identified and validated 90 Climate Change Adaptation options of which 60 were tested in the farmers' field. A total of 1187 field demonstrations were organized involving 1451 farming households. A total of 65 training were organized for more than 2000 people; organized 310 validation workshops with farmers and members of village and government committees; 160 social mobilization events targeting 35,750 farmers and the community.

Key example of the LACC Initiative:

Rain Water harvesting through mini pond

- Increased yield and income through supplemental irrigation of T. Aman rice
- In 2006 drought rice yield increased 23% and net profit 75%
- Helped to recharge ground water and tree plantation

Homestead gardening

- Increased soil cover in fallow land and soil moisture, reduced erosion
- Improved household nutrition
- Income generation for women

Improved Stove for Households

- Reduce fuel consumption by 30% and cooking time by 35%
- Cow dung can be used for fertilizer instead of cooking

Drought tolerant fruits (Jujube)

- Reduce risk through crop diversification
- Reduce irrigation demand
- In cropping with rice and vegetable.



Agricultural Adaptation to Changing Climate in Drought Prone Areas of Bangladesh

Based on the success and learning of the LACC, Disaster and Climate Risk Management in Agriculture (DCRMA) was initiated to improve adaptive capacity of communities for sustainable livelihood and food security of the hazard prone areas, specially of drought prone North West, Flood and flash flood prone North East and saline prone south western part of the country. The project kick started its activities by strengthening community based organization (Farmers Club/ Farmer's School), launching awareness raising campaign on climate change and adaptive technology and piloting various drought registrant crops in demonstration plots in the drought prone north western districts.

is the Barind Tract, a distinctive physiographic unit comprising a series of uplifted blocks of terraced land covering 8,720 km² in northwestern Bangladesh. Barind Tract covers nearly 773,000 ha land in Bangladesh, including 532,000 ha of cultivable land. With a variable rainfall and temperature ranging from 25 to 35 °C (regularly exceeding 40 °C) in the monsoon season, the area is considered semiarid and drought-prone.

Periodical droughts associated with late arrival or early withdrawal of monsoon rains, as well as intermittent dry spells affects wide range of crops with substantial reduction of food production. In 1997 drought, 1 million tons of food grain (mainly T.Aman) lost, entailing a loss of around US\$ 500 million Other associated risks include groundwater depletion due to excessive irrigation, drinking water scarcity etc.

With a view to provide the farmers with new drought tolerant crop option, the DCRMA project has initiated adaptation trial of high yielding variety of the New Rice for Africa (NERICA) during the Kharif-II season. This variety requires much less irrigation and has shorted life cycle than the regular Aman rice variety. This new option will ensure sustain crop yield in the face of increasing drought in the area.

The seeds were collected from Bangladesh Agriculture Development Corporation (BADC). The trials are demonstrated in 8 Upazilas (sub-district) from 4 northern districts. A team of 5 farmers from each sub- district have been selected, trained about the trial. A total of 40 farmers are involved and expected to be benefited directly from these demonstrations. Farmer's have seen a improved crops in all of the demonstration land.





Reducing Risks and Building Resilience at Community level

Ensuring Safe Drinking Water for Coastal Community

Surface water from rivers, ponds and other water reservoirs are the main source of drinking water in Bangladesh. With the sea level rise and saline intrusion, scarcity of drinking water is increasing in the coastal communities of Bangladesh and expected to be exacerbated by climate change. The coastal region covers almost 29,000 sq. km or about 20% of the country of which nearly 53% are affected by salinity. The salinity level is expected rise, pushing further inland to worsen the already devastating situation. Shortage of safe drinking water is likely to become more pronounced in coming years.

Saline water intrusion is seasonal in the coastal areas. During the rainy season (June-October) intrusion of saline water is minimum due to extreme flow of fresh water, but in the dry season, especially in winter, saline water goes upward gradually. Rain water harvesting, ponds, rivers and some place tube wells are the drinking water sources during monsoon. In the dry season communities are forced to travel long distance to collect drinking water. In some areas, households spend nearly BDT 20 (equivalent to USD .30), nearly one fifth of the daily household income. Reduction of pressure from in land and sea level rise due to climate change will result in the ingression of salinity, causing a devastating impact on livelihood, human health and social well being.

Women, girls and children who are generally responsible for household water collection, now have to travel longer distance, living them with less time to engage in livelihood and educational activities. School dropouts among girls increased significantly in past few years in this area. Longer engagement for daily water collection all so leads to unattended children and child labor. Other social consequence of severe shortage of drinking water includes teasing of women and conflicts between communities over water sources.

While significant time and financial resources are used for collecting water, household income decreases drastically. Poor households have less money for purchasing agricultural inputs. Household gardening and keeping of domesticated livestock also become difficult. All these factors together contribute to economic hardship for the poor families.

People in the region suffer from various diseases caused by drinking an insufficient amount of water and drinking water with high levels of salinity, impurity or arsenic contamination. Skin diseases, intestinal diseases, dysentery, fever and diarrhea are fairly common in the coastal districts. Other health concerns linked to lack of safe drinking water include malnutrition amongst women and children, reproductive problems for pregnant women. Women can be particularly susceptible to diseases as they are expected to take less water than men.

Various Adaptive Technologies for Safe Drinking Water

Access to safe water is important for human wellbeing. Unfortunately, no universal practices yet to be found to ensure safe drinking water for coastal communities. There are various technologies are used, however, each with their own merits and shortcomings. With increasing demand for safe drinking water of the coastal communities, a viable cost effective solution is needed immediately. Government of Bangladesh is working with various options to find the most effective ways of providing safe drinking water to coastal communities.

Rain Water Harvesting:

People in the coastal areas harvest rain water in small earthen pots for household use. Usually few hundred liters are gathered and used in subsequent days. Unfortunately, this method does not help people during the dry season. Excavation of existing ponds can be helpful to harvest rain water. However, the water becomes contaminated further into dry season and cause health risks. Investment in larger tanks to harvest rainwater proves to be more effective for ensuring safe drinking water. These cost effective tanks can be installed in household or community level.

Pond Sand Filters:

Widely used in various parts of the country, these Pond Sand Filters collect water from a water source and through filtration get rid of debris and germs. Although it has proven very effective building and maintaining Pond Sand Filters is quite expensive. With increased salinity of ground water, this filter becoming less effective.

Desalination Panel:

Powered by solar energy, these new technology can be used to remove salinity and germs from the available water. Each of the panel can produce 12-20 liters of water depending on the availability of sunlight. Unfortunately, the panel is beyond the means of most household. Government and NGOs are piloting the panel through providing subsidies or on reduced price through corporate social responsibility. Significant reduction in price and servicing centers are necessary for scaling up the panel.

Desalination Plant:

Government and Non Profit organization piloting the plant in few areas of coastal districts. Although the plant can provide water for entire community, it requires large initial investment, Maintenance of this technology based option is beyond the capacity of the community and requires outside patronage.





Reducing Risks and Building Resilience at Community level

Early Warning System Reducing Losses and Damages

Systemic observation of meteorological and hydrological information observations is precondition to estimate and forecast hazard risks and vulnerabilities. With the climate variability and change timely and accurate information is critical for Bangladesh. While erratic weather pattern and seasonal variations are intensifying, prediction and warning with enough lead time can save lives and assets.

Bangladesh Metrological Department (BMD) and Flood Forecasting and Warning Center (FFWC) are the two organizations for collecting hydro-metrological data from various national and international sources to predict the weather pattern as well as issuing early warning for cyclone, flood and flash flood. With the technological advancement the early warning mechanism improved dramatically in the country. At this moment, Bangladesh has capacity for 3 days deterministic Flood forecasting and striving to achieve a 7 days lead time. BMD can issue a warning as soon a pressure system visible in the Bay of Bengal.

This prediction and warnings are disseminated through various channels including the media to assist government in planning and response to natural hazards as well as help affected population to prepare for the hazard. Sea and river ports control their vassals based Warnings. Farmers and fishermen plan their livelihood activities based on the prediction and warning.

However, the success of early warning dissemination and preparedness in the country relays on the community based organizations. These community based early warning system is able localize the early warning messages and rally the community to action. Cyclone Preparedness Program (CPP) has received world recognition for promoting volunteerism and community involvement in reducing the risk natural disasters.

Community Based Early Warning for Vulnerability Reduction

Cyclone Preparedness Programme ensures effective early warning to communities at risk

The Cyclone Preparedness Programme (CPP) in Bangladesh is a unique institutional arrangement for community preparedness to address and reduce challenges and risks from catastrophic cyclones that frequently hits the country's coast. CPP evolved with a true spirit of volunteerism that Bangladesh can demonstrate to the global community. This is a joint programme of the Government of Bangladesh and Bangladesh Red Crescent Society provides a robust early warning system for the vulnerable coastal population

In the aftermath of the century's deadliest cyclone that killed 330,000 people in 1970, the Bangladesh Red crescent Society (BDRCS) mobilised community volunteers in the coastal regions. At present there are some 49,215 registered, trained, and equipped CPP volunteers in 37 Upazillas in 13 coastal districts of Bangladesh. They have been credited for the dramatic reduction in the cyclone-related deaths from hundreds of thousands three decades ago to tens of thousands and, nowadays, to some three thousands in the last years. The CPP volunteers have been with high degree of discipline, organisation, and devotion engaging in cyclone early warning dissemination, extending first aid, guiding people to cyclone shelters, and assisting in the relief distributions.

The CPP operates an extensive telecommunication network with 130 HF and VHF radio stations that link the field with the Headquarter. Each of Unit Team Leader is provided with a transistor radio to receive the warning that are relayed by the volunteers to the community by using powerful megaphones, handheld sirens, signal flags, and signal Light. Volunteer team leaders are provided with bi-cycles, motor-bikes to assist their mobility to receive and disseminate storm warning signals.

The Comprehensive Disaster Management Programme (CDMP) continues to support the Programme including its coverage expansion to five newly identified Upazilas in two districts and thus adding 6500 more volunteers into the existing CPP corps. The American Red Cross recently assisted with the volunteers' database updating and the refurbishment of the telecommunication network.



Reducing Vulnerabilities of the Extreme Poor through Social Safety Nets

Over the years, Bangladesh has reduced the extreme poverty from 35 % to 25% but the number is still very high i.e., some 40 million (UNFPA, 2010). The government is committed to achieve the MDG1 target of eliminating extreme poverty through integrated, comprehensive, and sustainable social safety nets.

The extreme poverty prohibits the investment in disaster reduction and climate change adaptation measures. Conversely, disastrous and climate change events hit them hard and prevent them from recovering from the impact. This vicious spiraling down phenomenon requires simultaneous addressing of the extreme poverty, disaster risk reduction, and the climate change adaptation. Bangladesh mobilises the different social safety nets to reach out to those most vulnerable to natural hazards and impacts of the climate change. This non-contributory transfer programs protect households from spiraling into deeper poverty and help them manage risk. This is done by providing food security, reducing seasonal vulnerability, and protecting, recovering, or expanding their livelihood assets bases to prevent the irreversible losses ensuing from disaster events.

The sixth Five Year Plan - a medium term development plan - emphasises safety nets to minimize income and consumption vulnerability for the extreme poor. In last two years alone, Bangladesh had spent about 15% of its annual budget and about 2.5% of the annual GDP. A wide spectrum of programmes has been operated by 13 different ministries and some NGOs covering various target groups.

Disaster Management and Relief Division (DMRD) of the Ministry of Food and Disaster Management are committed towards reducing risk and adapting to the climate change in conjunction with poverty reduction and sustainable development. The vision is to ensure food security at national, regional and household levels particularly for the poor. It implements the disaster-related safety nets as part of, complementing to, and interacting with the other sectoral programmes in the broader poverty reduction strategy. In the 2009-10 FY the DMRD delivered about 1.3 millions MT food grains distributed against the food safety net programs benefitting some 6.4 million households (20 millions vulnerable people). In the subsequent fiscal year in 2010-11 it realized some USD 630 million. budget The range of interventions includes the followings:

1. Provision of special food transfer to the vulnerable poor and the disadvantaged
2. Provision for cash transfer program by generating employment for the absolute poor.
3. Food security program for managing disaster and ensuring food security
4. Distribution of relief materials and develop overall infrastructure facilities including social protection



Major Safety Net Programmes in Bangladesh

Vulnerable Group Feeding (VGF) Programme: This is a mechanism for mitigating the disaster consequences without pre-set criteria or conditionality for participation to help the poor cope during disasters. The government steadily increases the total numbers of VGF cards from 0.56 million, to 0.76 million and in response to the latest major cyclone in 2007 became 1.7 millions benefiting some 14 millions people. In subsequent years the coverage has broadened to 18.3 millions vulnerable people.

Food-for-work - FFW (Kajer Binimoye Khadyo - KABIKHA): Food-for-work distributes food grains (rice and wheat) as wage payment to both male and female workers in labor-intensive public works programme. Participants are generally self targeting as the poor are typically the only ones willing to take on such jobs. For two consecutive years of 2009 - 2010 allocation in FFW has ensured a significant food security across the country each year with some 62 million person days were created by allocating 375,000 MT food commodities.

Test Relief Programme -(TR Programme): this programme is contributing to both the overall development of public welfare institutions and small infrastructure development. In FY 2008-09 and 2009-10, government has increased the allocation from 370,000 MT food grains to 400,000 MT respectively. These allocations increased the employment opportunities from 61 million to 65 million person days in 2008-09 and 2009-10 respectively.

Employment Generation Programme for the Poor (EGPP): The destitute people including those living in char, offshore islands, and eroded rivers lost their livelihood around 5 months in a year. The MoFDM implemented the "100 days Employment generation" program in 2008-09 FY and now continues under the EGPP. This is the first time Upazilla- based poverty map was used to identify the concentrated pockets of the hard core poor of the country. Aimed to eliminate poverty through employment creation, and develop small scale infrastructure in rural areas in 2009-10 this programme received nearly US\$ 150 million allocation and created employment opportunities for 125,000 people.



in Picture

Bangladesh's continuing efforts to raise awareness for preparedness and sustainable livelihood along with investment in infrastructure are ensuring disaster and climate resilient people and communities



