



Government of the People's Republic of Bangladesh

Ministry of Food and Disaster Management

COMPREHENSIVE DISASTER MANAGEMENT PROGRAMME

BGD/01/004

CDMP 2004-2009: Laying the Foundations for Comprehensive Disaster Management in Bangladesh



CDMP 2004-2009: Laying the Foundations for Comprehensive Disaster Management in Bangladesh

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“The disaster management vision of the Government of the People’s Republic of Bangladesh is to reduce the risk of people, especially the poor and the disadvantaged, from the effects of natural, environment and human induced hazards to a manageable and acceptable humanitarian level and to have in place an efficient emergency response management system.”

Forward

Table of Contents

I. Context	13
1.1. Background	13
1.2. Justification	13
1.3. CDMP Objective	15
1.4. CDMP Structure	15
1.5. Intervention Areas	17
1.6. Implementation Mechanism	17
II. Key Achievements	18
2.1. Professionalizing the Disaster Management Systems	18
2.2. Mainstreaming Disaster Risk Management Programming	24
2.3. Community Empowerment	30
2.4. Expanding Risk Reduction across hazards and sectors	45
2.4.1. Earthquake & Tsunami Preparedness	47
2.4.2. Climate Change ...	54
2.5. Operationalizing Response Management Systems	72
2.5.10. Prepared and disseminated Situation Reports (SitReps) during disaster period	80
III The Financial Progress	81
IV. Programme Management, Monitoring and Quality Assurance	85
V. Lessons Learned	
V. Way Forward	94

Acronyms & Abbreviations

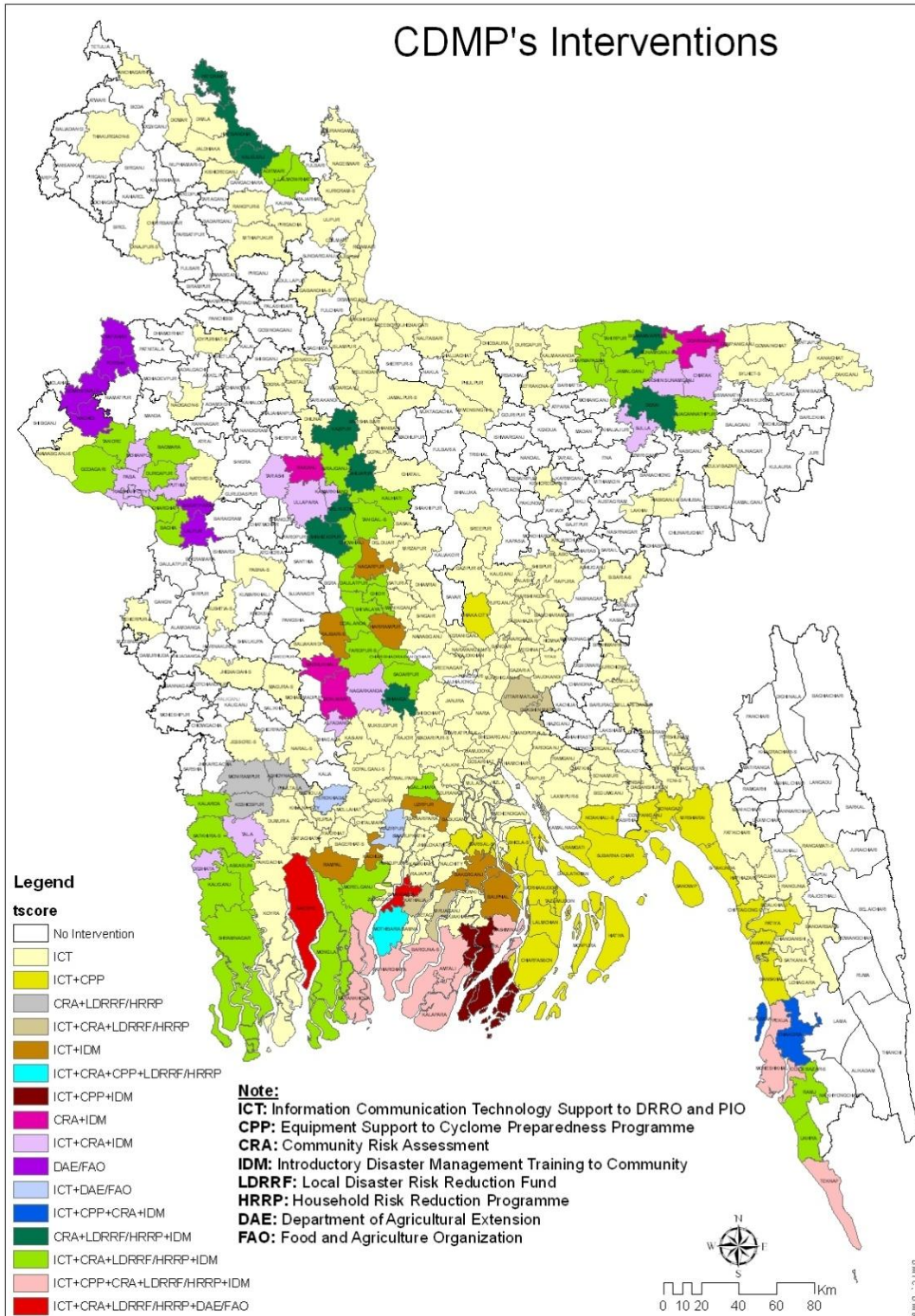
ADPC	Asian Disaster Preparedness Center
AFD	Armed Forces Division
AOB	Allocation of Business
ALO	Alternative Livelihood Options
AWG	Ad-hoc Working Group
BARD	Bangladesh Academy for Rural Development
BCS	Bangladesh Civil Service
BDPC	Bangladesh Disaster Preparedness Center
BUP	Bangladesh Unnyan Parishad
BR	Bangladesh Railway
BIWTC	Bangladesh Inland water Transport Authority
BTCL	Bangladesh Telecommunication Company Limited
BRR	Bangladesh Rich Research Institute
BARI	Bangladesh Agriculture Research Institute
BBS	Bangladesh Bureau of Statics
BCAS	Bangladesh Center for Advance Studies
BDRCS	Bangladesh Red Crescent Society
BFS	Brick Flat Soiling
BCSAA	Bangladesh Civil Service Administration Academy
BPATC	Bangladesh Public Administration Training Center
BFS&CD	Bangladesh Fire Service and Civil Defence
BMD	Bangladesh Meteorological Department
BPATC	Bangladesh Public Administration Training Centre
BUET	Bangladesh University of Engineering & Technology
BRAC	Bangladesh Rural Advancement Committee
COP	Conference of Parties
CRMIS	Central Relief Management Information System
CCA	Climate Change Adaptation
CSO	Civil Society Organization
CC	Climate Change
CBOs	Community Based Organisation
CCC	Chittagong City Corporation
CLCSSR	
CCC	Climate Change Cell
CTB	Computer Based Training
CDM	Comprehensive Disaster Management
CDMP	Comprehensive Disaster Management Programme
CEGIS	Center for Environmental Geographic Information Services
CPAP	Country Programme Action Plan
CUET	Chittagong University of Engineering & Technology
CRRAP	Community Risk Reduction Action Plan
CNRS	Center for Natural Resources Studies
CPP	Cyclone Preparedness Programme
CRA	Community Risk Assessment
CTA	Chief Technical Advisor
DFID	Department for International Development (UK)
DHTW	Deep Hand Tube Wells
DTW	Deep Tube Wells
DRM	Disaster Risk Management
DAP	Detailed Area Plan
DAE	Department of Agricultural Extension
DCC	Dhaka City Corporation
DM	Disaster Management
DMB	Disaster Management Bureau
DMC	Disaster Management Committee
DMIC	Disaster Management Information Centre
DMIN	Disaster Management Information Network
DoE	Department of Environment
DRR	Directorate of Relief and Rehabilitation

page 56, chapter 2.4.1.3(EQ & Tsunami)

DGoF	Directorate General of Food
DGHS	Directorate General of Health Services
DWASA	Dhaka Water Supply & Sewerage Authority
DRR	Disaster Risk Reduction
DC	Deputy Commissioner
DDIS	Disaster Damage Information System
DIDB	Disaster Incident Database
DPDC	page 54, Table- 6 (EQ & Tsunami)
DMR	Disaster Management & Relief
DESCO	Dhaka Electricity Supply Company
DRRO	District Relief and Rehabilitation Officer
DU	University of Dhaka
ECNEC	Executive Committee of the National Economic Council
EOC	Emergency Operations Center
EU	European Union
EQ	Earth Quake
FAO	Food and Agricultural Organization
FSCD	Fire Service & Civil Defense
FGD	Focus Group Discussion
FFWC	Flood Forecasting Warning System
GDACS	Global Disaster Alert Co-ordination System
GHG	Green House Gas
GUP	Gono Unnayan Prochesta
GUS	Gono Unnayan Sanstha
GSB	Geographical Survey of Bangladesh
GIS	Geographic Information Services
GDP	Gross Domestic Product
GLIDF	GlobalID Fntifier
GOB	Government of Bangladesh
HAZUS	HAZards United States
HRRP	Household Risk Reduction Plan
HIV	Human Immune Deficiency
ICT	Information and Communications Technology
IDDR	International Day for Disaster Reduction
IWFM	Institute of Water & Flood Management
IEC	Information, Education and Communication
IWM	Institute of Water Modeling
IGA	Income Generating Activities
ISDR	International Strategy for Disaster Reduction
IDM	Introduction to Disaster Management
IMED	Implementation, Monitoring and evaluation Division
ICRRP	Information on Community Risk Reduction Programme
IEC	Information, Education and Communication
IED	Institute for Environment & Development
IDDR	International Day for Disaster Reduction
ICDDRDB	International Center for Diarrhoeal Disease & Research , Bangladesh
JU	Jahangirnagar University
JCF	Jagorani Chakra Foundation
JJS	Jagrata Jubo Sangha
KII	Key Informant Interview
KU	Khulna University
LLA	Life Line Authorities
LAN	Local Area Network
LCA	Long-term Cooperative Action
LOA	Letter of Agreement
LGED	Local Government Engineering Department
LACC	Livelihood Adaptation to Climate Change
LDRRF	Local Disaster Risk Reduction Fund
MDG	Millennium Development Goals
MDRM	Ministry of Disaster Management and Relief
MoF	Ministry of Food
MoFDM	Ministry of Food and Disaster Management

MRI	Magnetic Resonance Imaging
MoU	Memorandum of Understanding
NGO	Non-government Organisation
NDP	National Development Programme
NAEM	National Academy for Educational Management
NCTB	National Curricula Textbook Board
NDDR	National Day for Disaster Reduction
NSU	North South University
NIPSOM	National Institute of preventive and Social Medicine
NTIWG	National Technical Working Group
NPD	National Programme Director
NDPD	National Disaster Preparedness Day
NWMP	National water Management Plan
NEX	National Execution Manual
NAPA	National Adaptation Programme of Action
PIC	Project Implementation Committee
PIO	Project Implementation Officer
PWD	Public Works Department
PWD	Person with Disability
PRA	Participatory Rural Appraisal
PPDU	Policy , Programme and Partnership Development Unit
PPRR	Prevention,Preparedness ,Relief and Rehabilitation
PRSP	Poverty Reduction Strategy Paper
PRECIS	Providing Regional Climates for Impacts Studies
PSF	Pond Sand Filter
PEER	Programme for Enhancement of Emergency Response
PGA	Peak Ground Acceleration
PSTU	<u>Patuakhali Science & Technology University</u>
RDA	Rural Development Academy
RAJUK	Rajdhani Unnayan Katripakkya
RIC	Resource Integrated Center
RDRS	Rangpur Dinajpur Rural Services
RRAP	Risk Reduction Action Plan
RWH	Rain Water Harvester
RHD	Roads & Highways Department
SOD	Standing Order on Disaster
SAARC	South Asian Association for Regional Cooperation
SPARRSO	Space Research and Remote Sensing Organization
SLR	Sea Level Rise
SCC	Sylhet City Corporation
SBSTA	Subsidiary Body for Sceince and Technology
SSAOs	Sub-Assistant Agricultural Officer
STW	Shallow Tube Wells
SMRC	SAARC Meteorological Research Center
SSB	Single Sub-Band
SSC	Senior Staff Course
TAG	Technical Advisory Group
ToR	Terms of Reference
TBAs	Trained Birth Attendant
ToT	Training of Trainers
UTIWG	Union Technical Implementation Working Group
UNO	Upazila Nirbahi Officer
UNFCC	United Nations Framework Convention on Climate Change
UNBCPR	United Nations Bureau of Crisis Prevention & Recovery
UNISDR	United Nations International Strategy for Disaster Reduction
UNDP	United Nations Development Programme
UDMC	Union Disaster Management Committee
UzDMC	Upazila Disaster Management Committee
WCDR	World Conference on Disaster Reduction
WSSD	World Summit on Sustainable Development

CDMP's Interventions



Highlights of CDMP I

- Produced for MoFDM the revised Disaster Management Act, revised SOD, National Plan for Disaster Management 2008-2015, SAARC Framework for Comprehensive Disaster Management 2006-2015, Draft Disaster Management Policy, Policy Matrix on comprehensive disaster management towards poverty reduction and growth for inclusion in PRSP I & II
- Supported MoFDM to produce the MoFDM's 5 year Corporate Plan (2005-2009), DMB, DRR and DGoF's 3 year Strategic Plans of 2005-2007
- Supported 44 GoB officials to attend 3-months certificate and diploma courses on disaster management at BRAC University, Swinburne University at Australia and Asian Disaster Preparedness Center (ADPC) at Bangkok
- In partnership with 22 public training and academic institutions introduced regular disaster management professional training for BCS cadre officials and the university graduates:
 - Conducted 22 expert review meetings and consultation workshops to finalize the curricula for 2- and 5- day long professional training and 14 week long diploma courses on disaster management by the respective training institutes and university departments. A total of 550 professionals attended the workshops
 - Offered 9 ToTs for the 235 university teachers and training institute faculties who facilitated the disaster management related training and education programmes of their respective institutions including the CDMP supported ones
 - Organized twenty-one 2- and 5-day long professional disaster management training courses that outreached a total of 798 current and prospective disaster managers.
 - Offered 14-weeklong post graduate diploma with 5 university departments - 125 students attended and received the post-graduate diploma certificate on Disaster Management
 - Provided research grants to 70 students from 14 departments of different public universities.
 - Supported NCTB to conduct an action research on need assessment of students, teachers and parents on disaster management education
 - Organized 5 field trips for the 79 Senior Staff Course (SSC) participants of BPATC and 98 BCS Admin. Foundation Course participants of BCSAA to the CDMP pilot sites in order to practically demonstrate of some CDMP's key risk reduction activities at the field level.
 - Developed 5 short course modules (1-hour, 2-hour, 4-hour, 8-hour and 12-hour) on comprehensive disaster management along with the necessary training materials (instructors' guidebook and participants' handbook) for incorporation in training programmes of public training institutes.
- Trained around 28,000 union, upazila and district DMCs in 16 districts on comprehensive disaster management
- Produced risk reduction action plans for 644 unions of 16 districts through development and adoption of a uniform community risk assessment and risk reduction action planning tool. Implemented 562 small scale risk reduction projects in 381 Unions of 11 districts benefitting over 600,000 people living in the pilot intervention areas.
- With financial support from EU a livelihood support component was implemented in 24 unions of 9 flood 2007 and cyclone *Sidr* and *Aila* affected districts. The programme included construction of 75 km single layer brick flat soling road, construction of flood and cyclone resilient houses, giving of poultry and livestock and input for small traders to generate immediate income, installation of PSF, DTW, STW, RWH and other devices to ensure safe drinking water, life support to the people with disabilities, skill and awareness training.
- Assessed earthquake risks and vulnerabilities of Dhaka, Chittagong and Sylhet city corporations, identified vulnerable infrastructures, developed alternative strategies for actions by the Government
- Developed contingency plans for Dhaka, Chittagong and Sylhet City Corporations, Disaster Management Bureau (DMB), Directorate of Relief and Rehabilitation (DRR), Directorate General of Health Services (DGHS), Armed Forces Division (AFD) and Bangladesh Fire Service and Civil Defence (BFS&CD), Life Line Authorities (Gas, electricity, water and telecommunications).
- Strengthened the Bangladesh Fire Service and Civil Defence with training and search and rescue equipments support.
- Established the urban volunteer programme in Dhaka, Chittagong and Sylhet city corporations under which trained 1050 urban volunteers on search and rescue operations
- Established the Climate Change Cell within the Department of Environment. The Cell supported GoB with policy inputs for international climate change negotiations, institutionalized climate change prediction modeling through external training and input support, conducted 7 pilot adaptation research to understand current local practices; and capacity building of the stakeholders through advocacy and awareness at national and local levels
- In collaboration with FAO and DAE identified and tested 60 livelihood options for adaptation in the changing climate utilizing a comprehensive framework being developed through consultation process
- Established the national Disaster Management Information Centre (DMIC) at the Disaster Management & Relief Bhaban as a central disaster management information and communication hub
- Established early warning and disaster information communication network with DMIC, 64 district DRRO and 235 high risk upazila PIO offices through ICT equipment and network support.
- Extended the early warning, search and rescue equipment support to 500 CPP unit offices, search & rescue training to 38,500 existing and 6500 new CPP volunteers
- Printed 20,000 copies of the risk reduction and climate change adaptation handbook for Sub-assistant Agricultural Officers (SAAOs) and farmers
- 5 video documentaries on comprehensive disaster management model, earthquake preparedness, climate change impacts and LDRRF good practices
- Indigenous coping mechanism source book, disaster dictionary, climate change database, etc

Country	Bangladesh
No. and title of the Programme/project	[BGD/01/004: Comprehensive Disaster Management Programme (CDMP)]
Executing Agency	Ministry of Food and Disaster Management (MoFDM)
National Project Director	Secretary, MoFDM
Deputy Project Director	Director General, Disaster Management Bureau (DMB)
Project Period	March 2004 – December 2009
Reporting Agency	MoFDM
Project Goal:	To strengthen the capacity of the Bangladesh disaster management system to reduce unacceptable risks and improve response and recovery activities
Project Purpose:	To achieve a paradigm shift in disaster management from conventional response and relief to a more comprehensive risk reduction culture
Geographical Coverage:	The programme started with 7 pilot districts namely Cox’s Bazaar, Faridpur, Lalmonirhat, Rajshahi, Shatkhira, Shirajgonj and Sunamgonj selected on the basis of their vulnerability to different types of hazards. In 2008 it expanded to 3 Flood 2007 and 6 cyclone <i>Sidr</i> affected districts (Manikgonj, Tangail, Rajbari, Barguna, Jhalokathi, Pirojpur, Patuakhali, Khulna and Bagerhat)

1. Context

1.1. Background

Bangladesh has been recognised as a country at high risk of recurring natural and human induced hazards with an average 10 million people affected every year. Frequent floods, cyclones, river bank erosion, water-logging, drought and tornadoes significantly disrupt Bangladesh's economy and the lives and livelihoods of its population. During 1990-2008 country incurred annual loss of USD 2,189 million (1.8% of annual GDP) from disasters and the average annual death toll was 8,241 i.e., 6.27 person per 100,000 inhabitants (Harmeling 2009).

In the aftermath of the 1991 catastrophic cyclone which had taken away 138,000 peoples' lives and left havoc destroying everything in its path, the government of Bangladesh with support from development partners had created an apex institutional framework from national down to the local level to deal with disaster management in its full cycle. To energize further the institutional structure to become proactive round the year, by changing their mindset from taking action only when there was the threat of hazard or a disaster occurred, the Comprehensive Disaster Management Programme (CDMP) was designed and approved in December 2002.

CDMP is a collaborative effort by the Government of the People's Republic of Bangladesh, the United Nations Development Programme (UNDP), the UK Department for International Development (DFID), and the European Union (EU) which seeks to move the Bangladesh disaster management emphasis from a response and relief focus to a broader and more encompassing risk management framework. . CDMP is a very high profile multi-hazard, multi-sector and multi-stakeholder programme with the Secretary, Ministry of Food and Disaster Management (MoFDM) as the National Programme Director. CDMP was designed with an initial 10 components, and officially started its implementation with an Inception Workshop on 17 March 2004 to support the Government of Bangladesh's efforts toward achieving the following vision, mission and objectives on disaster Management:

Government Vision

To reduce the vulnerability of the people, especially the poor, to the effects of natural, environmental and human induced hazards to a manageable and acceptable humanitarian level.

MoFDM Mission

To strengthen the capacity of the Bangladesh disaster management system to reduce unacceptable risks and improve response and recovery activities.

Objectives

To achieve a paradigm shift in disaster management from conventional response and relief to a more comprehensive risk reduction culture.

In August 2006 a contribution agreement between the UNDP-EC Delegations was signed to include three more components.

1.2. Justification

Bangladesh has a well established disaster management institutional framework that extends from the highest level of government through to Union and Local Government levels. Although these systems mobilise quite quickly immediately before and after a crisis event, they are not so well energized to undertake a proactive leadership role in driving risk reduction initiatives. Similarly, those officials appointed to leadership roles often lack the professional skills and competencies and were frequently transferred making capacity building a continual challenge.

Although many international and national NGO's participated in Community Risk Assessment (CRA) activities there were inconsistencies with the methodologies and scope of the assessments and generally little or no interface with Local Government or government planning. Most lacked the resources to convert risk assessment activities into tangible risk reduction outcomes. Keeping track of activities across multiple organisations is difficult and duplication was often experienced.

Urban drift had created significant unemployment challenges within the major cities which in-turn has given rise to an increase in unplanned development including encroachment into water ways. Although Earthquakes were not a regular occurrence, three of Bangladesh's largest cities including the capital Dhaka are situated within earthquake risk zones. Though generic earthquake hazard maps were available there were no risk specific maps to guide land use planning or contingency planning at all levels. While Bangladesh had considered being at low risk of Tsunami, storm surge was on the increase and more needed to be done to map the risks to guide early warning, land-use planning, contingency planning and awareness.

Climate change was the unknown factor. While a number of global predictions had been made it was important for Bangladesh to convert these into national impact statements to guide adaptation at the development planning, sector and community levels.

Even though Bangladesh had a proven record of being able to respond quickly to crisis events, there was a need to improve response planning at the district and lower levels in addition to increasing operational decision making skills of designated leaders. Communication networks existed however these were generally fragmented and not linked to the official warning centres. Existing community warning systems needed also to be aligned with the levels of community risk and provide clearer guidance on actions had to be taken relative to risk factors.

CDMP introduced the concept of risk reduction as a critical part of development planning and community safety considerations. Generally, CDMP was designed to facilitate the reduction of long-term risk and to strengthen the operational capacity to respond to emergencies and disaster situations including actions to improve recovery from these events.

Key benefits associated with this approach were that:

- The resources and expertise of government, NGO, private sector and the community are deployed according to national priorities and community risk reduction programming needs, not organisational preference.
- It provides a big picture of what needs to be done and therefore acts as a mechanism for identifying gaps, monitoring and observing achievement.
- It provides the basis upon which formal collaborating partnerships are developed and nurtured.
- It facilitates the validation of new projects against country risk reduction needs
- It serves as a management tool for development partners and regional organisations to guide their inputs.

- It provides a holistic partnership framework to integrate the Programmes, Priorities and Resources of Government, NGO's and Private Sector in one consolidated Risk Reduction Programme:

CDMP had adopted a programme approach that encompasses all aspects of risk management and in so doing facilitated the move from a single agency response and relief system to a whole of government holistic strategy that addresses the issue of community vulnerability. This strategy was consistent with the GoB's vision for a more comprehensive approach to addressing the issues of risk and vulnerability. The benefits that were expected to be derived from this approach include:

- a. it involved all strategic partners in a collaborative approach to risk and vulnerability reduction
- b. it ensured that risk is addressed in its entirety for all major hazards
- c. it ensured that vulnerability reduction programmes target the whole country including major urban centres
- d. it enhanced coordination and information sharing across component projects
- e. it maximized the efficacy of donor support through more effective utilization of resources
- f. it maximized the use of scarce GoB resources
- g. It resulted in more sustainable benefits to communities through avoidance of duplication and facilitating an even geographical spread of projects which prevents an overloading of community capacities and increases benefits.
- h. it was demand driven in that programmes are designed around specific community needs.

This approach did not restrict a continuation of bi-lateral funding direct with NGOs or other organizations. It did provide a mechanism through which projects can be more effectively validated.

1.3. CDMP Objective

To strengthen the capacity of the Bangladesh disaster management system to reduce unacceptable risks and improve response and recovery activities.

1.4. CDMP Structure

CDMP is a very high profile multi-hazard, multi-sector and multi-stakeholder programme implemented during 2004-2009. The Programme was designed around five strategic focus areas and comprised of 12 components (**Table 1**).

Table 1. CDMP Structure and the Resources

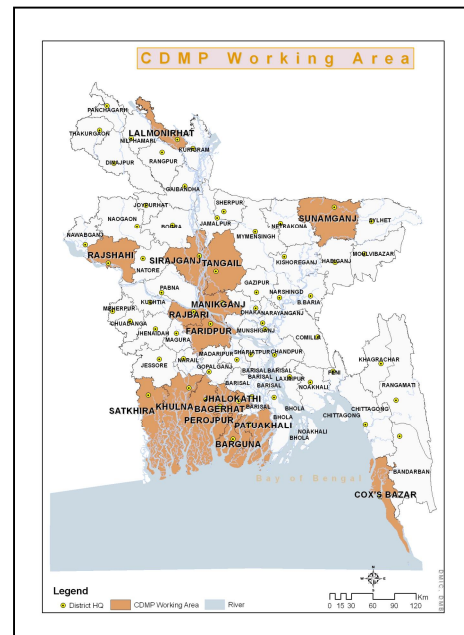
Sl. No.	Sub-Programme	Components	Implementing and Sub-Implementing Agencies	Budget in US\$	Funded by
1.	Capacity Building	a) Establishment of the Policy, Programme and Partnership Development Unit (PPDU)	MoFDM, UNOPS, UNDP	4,184,642	UNDP EU
		b) Professional skilling of MoFDM and key implementing agency staff	MoFDM, UNOPS	1,122,229	UNDP
2.	Partnership Development	a) Advocacy Programme	DMB, UNOPS	376,933	UNDP
		b) Training and Briefing Programmes for Disaster Management Committees	DMB, UNOPS	1,698,142	UNDP
3.	Community Empowerment	a) Programme Gap Analysis	MoFDM, UNOPS	53,445	DFID
		b) Community Risk Reduction Programmes	DRR, UNOPS	747,420	DFID
		c) Local Disaster Risk Reduction Fund (LDRRF)	MoFDM, UNOPS	4,207,383	DFID
		d) Livelihood Security – Hazard Awareness	MoFDM, UNDP, FAO, DAE	3,021,727	EU & UNDP
4.	Research Information Management	a) Earthquake and Tsunami Preparedness	MoFDM, UNDP	5,019,296	EU & UNDP
		b) Capacity building on Climate Change Risk Management	DoE, UNOPS, FAO, DAE	2,132,120	DFID & (UNDP)
5.	Response Management	a) Establish and Strengthening the Capacity of the DMIC	MoFDM, UNOPS	1,251,854	DFID
		b) Disaster Management Information Network	MoFDM, UNDP	2,149,874	EU
		Total		25,965,065	

The primary focus of CDMP interventions was to facilitate the transition of the Bangladesh existing response and relief emphasis to a more comprehensive risk management culture. The strategies for achieving this goal evolved around five key areas:

- i) Professionalising the disaster management system
- ii) Mainstreaming disaster risk management within development and investment planning processes
- iii) Strengthening community institutional support systems
- iv) Expanding mitigation and preparedness programmes to cover a wider range of hazards and geographical areas.
- v) Operationalising response management systems

1.5. Intervention Areas

CDMP was designed as a two phased programme. The first [pilot] phase 2004 – 2009 was to undertake a thorough review of existing disaster management systems, and policy and legislative frameworks with a view to lay the foundations for longer term disaster risk reduction programmes and reforms. CDMP's community level interventions initially targeted seven districts namely, Lalmonirhat, Rajshahi, Sunamganj, Faridpur, Cox's Bazar, Sirajganj, and Satkhira. Following the devastations of Cyclone *Sidr* and Flood 2007, programme activities had been expanded to 9 more districts (Flood 2007 affected Manikgonj, Tangail, Rajbari and *Sidr* affected Barguna, Jhalokathi, Pirojpur, Patuakhali, Khulna, Bagerhat).



1.6. Implementation Mechanism

CDMP was a nationally executed programme implemented by the MoFDM with the assistance of a number of sub- implementing agencies including; Disaster Management Bureau (DMB), Directorate of Relief and Rehabilitation (DRR), Department of Environment (DoE), Department of Agriculture Extension (DAE)/Food and Agriculture Organization (FAO), Geological Survey of Bangladesh (GSB) and Bangladesh Fire Service and Civil Defense (BFS&CD). Over hundred NGOs, government, semi government and technical and academic institutions (e.g. CEGIS, IWM, BMD, DU, JU, KU, PSTU, CUET, BUET, BPATC, BCSAA, BARD, RDA ...) and regional organizations including Asian Disaster Preparedness Center (ADPC), UN-International Strategy for Disaster Reduction (UN-ISDR), UN-Bureau for Crisis Prevention and Recovery (UN-BCPR) had contributed to the overall implementation of CDMP.

2. Key Achievements

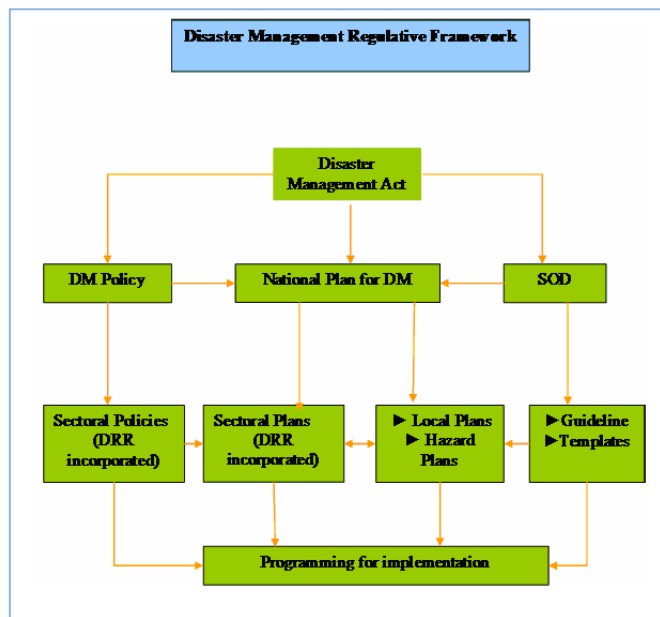
2.1. Professionalizing the Disaster Management System.

For the purpose of professionalizing the disaster management system a three pronged approach was adopted that included a) policy support to MoFDM; b) capacity strengthening of MoFDM and its agencies; and c) establishment of a training and education network with 22 public training and academic institutions throughout the country.

2.1.1. Policy support to MoFDM

In order for establishing the Bangladesh Disaster Management Regulative Framework (Diagram 1)

CDMP supported the Ministry of Food and Disaster Management and the Disaster Management Bureau in redrafting the Disaster Management Act, Disaster Management Policy, development of the National Disaster Management Plan and also revising the Standing Orders on Disasters first introduced in 1997. During CDMP launching all the policy documents were in draft form and response focused. With the launching of the Hyogo Framework for Action (HFA) 2005-2015 in January 2005, at Kobe, Japan, the worldwide emphasis in disaster management had been shifted towards disaster risk reduction. The



government of Bangladesh as a cosignatory of HFA also revisited its mandate on disaster management and accordingly all the policy documents were revised with CDMP support to comply with the revised mandate. The major revision have been made in the Standing Orders on Disasters (SOD) last published in 1999 to change its focus from conventional relief and response to the creation of a disaster risk reduction culture, aligning it with the updated Disaster Management Act. All the policy documents were finalized through stakeholder consultations with civil society actors and submitted to MoFDM via DMB for final endorsement by the appropriate entities.

One of the major achievements for Bangladesh and for the South Asian Region is the “SAARC Framework for Action on Comprehensive Disaster Management 2006-2015”. The framework document was developed in early February 2006 through a 2-day regional expert group meeting held in Dhaka and endorsed by the SAARC Environmental Ministers in a meeting in May 2006. Bangladesh hosted both the events and CDMP professionals were instrumental in supporting the MoFDM in attaining this outcome. This framework is modeled around the CDMP design and represents a unique opportunity to establish uniformity in and across all SAARC countries.

Establishing the SAARC Disaster Management Centre in New Delhi also took place during the lifetime of CDMP. MoFDM was the Chair of the Governing Board for the first two years. CDMP supported the ministry to ensure the Bangladesh interests were protected in the Rules of Business of the Centre.

In 2005 government through a gazette notification created the Ministry of Food and Disaster Management by amalgamating the Ministry of Disaster Management and Relief (MDRM) and the Ministry of Food. Revision of the Allocation of Business (AoB) of the newly formed ministry was then an administrative and management requirement of the government. For CDMP it was an opportunity to ensure that the disaster risk reduction philosophy and the CDMP functions are well embedded within the functions of MoFDM. As per the revised Allocation of Business MoFDM's core functions relating to Disaster Management include among others formulation of policy, plan and operational guidelines; ensuring mainstreaming DRR across sectors and hazards; emergency preparedness; early warning information dissemination; management and coordination of the overall response and rehabilitation activities; disaster information management; and regional and international cooperation. The revised AoB had been approved by the Secretarial Committee of the Government of Bangladesh.

2.1.2. Capacity strengthening of MoFDM and its agencies

To drive the paradigm shift in disaster management from a reactive relief and response towards a proactive risk management culture the reorientation of the people and their mindset working in MoFDM and its 3 operational departments namely DMB, DiRR and Directorate Generale of Food (DGoF) was necessary. The followings have been done to improve the organizational and individual capacity to drive and coordinate their mandated jobs:

- Developed the MoFDM's 5-year Corporate Plan (2005-2009), DMB, DiRR and DGoF 3-year Strategic Plans for (2005-2008)
- Conducted a need and capacity assessment and developed a Learning and Development Strategy for the MoFDM to enhance the technical and management skills of the MoFDM staff and other govt. officials of key ministries
- Developed a training plan for MoFDM
- Supported 44 GoB officials in attaining 3-months certificate and diploma courses on disaster management at BRAC University, Swinburne University at Australia and Asian Disaster Preparedness Center (ADPC) at Bangkok
- Provided two-day orientation training on comprehensive disaster management and 8-weeklong ICT training to all the DRR staff posted at head office and local levels
- Provided IT equipment support, established LAN and updated the MoFDM, DMB and DRR websites
- Facilitated high level participation of MoFDM and its agency officials in different regional and global meetings and negotiations for profile raising with technical and logistic support

2.1.3. Establishment of the training and education network

Disaster management is a cross cutting issue and has its own multi-dimensionality. Disaster affects each and every sector and the individuals. The revised Standing Orders on Disasters describes the roles and responsibilities of the sectors, institutions and the individuals. To perform their assigned jobs it was found necessary to provide a thorough knowledge on the disaster management approach and the cycle. In 2007 CDMP conducted a disaster management training needs and capacity assessment survey among all the public training institutes and selected NGOs. The process involved collection and review of the training course materials, review of relevant policy documents including the revised SOD and the training policy of the government, arranging a consultation workshop with GoB and NGO officials to identify individual disaster management training needs, a competency assessment of these institutions to offer and manage the required disaster management courses, and finally a discussion session with representatives from the surveyed public training institutions and NGO to identify the disaster management training needs and the gaps.

The assessment revealed that that the demand for disaster management training and research has increased manifold over the last decade. The existing public training institutes do not have the trained manpower as well as requisite training materials to run such courses. There are also huge knowledge gaps among various disaster management stakeholders since few of them received any training on disaster management. Those with training also not have very clear understanding on these new concepts as well as the different technical, technological and policy options for disaster risk reduction in their respective sector. The existing public training institutes including DMB do not have adequate required technical skills and the capacity to run such huge number of training courses to cover all the wide range of stakeholder groups at national, regional and local levels. The establishment of a full-fledged disaster management training and research institute as well as capacity development of the existing public training institutes as the two complementary strategies for implementation was recommended.

Establishment of the Bangladesh Disaster Management Training and Research Institute involves huge cost as well as the high level policy decisions which obviously will take time. The main thrust of the strategy is to mainstream necessary DM training activities by supporting the relevant training programmes of other institutions, which would essentially contribute to the mainstreaming of disaster risk reduction across sectors. Therefore, as an immediate step CDMP went for the implementation of the 2nd strategy of utilizing the existing facilities of the public training institutes, establishing a partnership network with them, developing the trainers through ToTs as well as some short training modules and providing the institutes with some financial resources to run some joint training programmes to build their capacity to run such training programmes on disaster management in the future.

CDMP also conducted a curricula review study in the education sector at primary, secondary and tertiary levels to identify and recommend the scope of integrating DRR, along with ways and means of sensitizing the policy makers about DRR and utilizing the media to further the agenda. The initiative was coinciding with the UNESCO's World Disaster Reduction Campaign 2006-07 focused on promoting the safety of school buildings and the mainstreaming of disaster risk reduction (DRR) into school curriculum. The campaign was launched with the understanding that risk reduction education in school can significantly contribute in building and nurturing and strengthening a culture of prevention and disaster resilience. It contributes to continuous learning and reinforces disaster risk reduction knowledge. Educating younger generation instills disaster risk reduction as a value in them, which will be transmitted to the future generation.

The study reviewed existing curricula and co-curricular activities of all the three (general, *Madrasa*, and Technical) education system of primary and secondary levels as well as the syllabus of the major

public and private universities. In order for ensuring the integration of disaster risk reduction into education curriculum at various levels the study suggested separate mainstreaming strategies for general, *madrasa* and technical education and the universities as all these educational streams have their own institutional framework and governance mechanism.

CDMP applied a combined strategy and established a Training and Education Network by signing MOUs and financial contracts with 20 different institutions. Under these agreements funds were provided for a number of activities and the details are given in Table 2.

Table 2: Details of the activities Undertaken under the Training & Education Network

Institutions/Organizations	Events
1. National Curricula and Textbook Board (NCTB)	<ol style="list-style-type: none"> 1. Expert consultation workshop to review the existing provision in the textbooks and the curricula 2. Action Research on Need Assessment of Students, Teachers and Community People
2. Department of Sociology, Dhaka University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training course 3. Offer the diploma on disaster management 4. Research grant for 5 field studies
3. Institute of Social Welfare & Research, Dhaka University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and to design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Offer the diploma 4. Research grant for 5 field studies
4. Department of Environmental Science and Disaster Management, Patuakhali Science & Technology University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Offer the diploma 4. Research grant for 5 field studies
5. Environmental Science Discipline, Khulna University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Offer the diploma 4. Research grant for 5 field studies
6. Biotechnology and Genetic Eng Discipline, Khulna University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Offer the diploma 4. Research grant for 5 field studies

7. Department of Urban & Rural Planning, Khulna University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
8. Department of Geography & Environment, Jahangirnagar University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
9. Department of Environmental Sciences, Jahangirnagar University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
10. Institute of Environmental Sciences, Rajshahi University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
11. Department of Environmental Science and Natural Resource Management, Mowlana Bhashani Science & Technology University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
12. Graduate Training Institute, Bangladesh Agriculture University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
13. Department of Agricultural Extension Education, Bangladesh Agriculture University	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
14. Department of Civil Eng , Chittagonj University of Engineering & Technology (CUET)	<ol style="list-style-type: none"> 1. Expert consultation workshop to review and revise existing curricula incorporating DRR & CCA issues and design a 5-day professional training course and 14-weeklong diploma courses 2. Offer 5-day long professional training 3. Research grant for 5 field studies
15. Bangladesh Public Administration Training	<ol style="list-style-type: none"> 1. Expert consultation workshop to review curricula of the existing training courses and design a 2-day long

Centre (BPATC)	<ul style="list-style-type: none"> professional training on DM for BCS cadre officials 2. Offer 2-day long professional training for the participants of the foundation courses 3. Arrange 2 Field Visits for the high govt. officials to the CDMP working areas
16. Rural Development Academy (RDA), Bogra	<ul style="list-style-type: none"> 1. Curricula review workshop to develop a 5-day ToT programme on DM 2. Offer ToTs to the CDMP selected participants (6)
17. Bangladesh Academy for Rural Development (BARD)	<ul style="list-style-type: none"> 1. Curricula review workshop to develop a 5-day ToT programme on DM 2. Offer ToTs to the CDMP selected participants (3)
18. National Academy for Educational Management (NAEM)	<ul style="list-style-type: none"> 1. Organize thematic workshops (7) 2. Offer 5-day long professional training
19. Bangladesh Civil Service (Admin) Academy, Dhaka	<ul style="list-style-type: none"> 1. Expert consultation workshop to review curricula of the existing training courses and design a 2-day long professional training on DM for BCS cadre officials 2. Offer 2-day long professional training for the participants of the foundation courses 3. Arrange 1 Field Visit for the high govt. officials to the CDMP working areas
20. Armed Forces Division (AFD)	<ul style="list-style-type: none"> 1. Curricula review workshop to develop a 5-day ToT programme on DM 2. Offer 5-day long professional training (2)

Under the Training and Education Network the following achievements have been made:

- Reviewed and revised existing training and education curricula of all the 20 entities with whom MoUs were signed
- Conducted 22 expert review meetings and consultation workshops to finalize the curricula for 2- and 5- daylong professional training and 14 week long diploma courses on disaster management by the respective training institutes and university departments. A total of 550 professionals attended the workshops
- Offered 9 ToTs for the 235 university and training institutes faculties who facilitated the disaster management related training and education programmes of their respective institutions including the CDMP supported ones.
- CDMP jointly with the respective partner institutions had organized twenty-one 2- and 5-daylong professional disaster management training courses that outreached a total of 798 current and prospective disaster managers.
- Offered 14-weeklong post graduate diploma with 5 university departments. 125 students attended and received the post-graduate diploma certificate on Disaster Management
- Research grants were provided to 140 students from 14 departments of different public universities.
- NCTB has conducted an action research on need assessment of students, teachers and community people on disaster management education
- Organized 5 field trips to the CDMP pilot sites for the 177 Senior Staff Course (SSC) participants of BCSAA and BPATC in order to practically demonstrate of some CDMP's key risk reduction activities at the field level.
- Developed a 1-hour, 2-hour, 4-hour, 8-hour and 12-hour short course modules on disaster management for public training institutes and academies. Good Earth

produced 5 short course modules on comprehensive disaster management along with the necessary training materials (instructors' guidebook and participants' handbook) for incorporation in training programmes of public training institutes.

As a result of the CDMP's above multi-pronged interventions the demand for disaster management training and education has increased manifold. To meet the increasing demand the newly established Centre for Disaster and Vulnerability Studies of Dhaka University has launched a post-graduate Masters programme on disaster management while Patuakhali Science and Technology University (PSTU) offered a graduate programme on disaster management from 2010. The Board of Studies Committee of the Department of Environmental Science, Bangladesh Agricultural University, Mymensingh has accepted the Modified Syllabus of Introduction to Disaster Management, which is now being taught at Masters level degree programme as a compulsory course. The modification was done by incorporating recommendations of an expert consultation workshop. All the public training institutions follow the CDMP outline in their mandatory two-hour class on disaster management in every foundation courses for the BCS cadre officials.

2.2. Mainstreaming Disaster Risk Management Programming

This focus area comprised of a) an advocacy component that had targeted key policy officials, the media and NGOs to promote the need for coordination and uniformity in disaster management; and b) a capacity building component targeting the members of the disaster management committees at district, upazila and union levels.

2.2.1. Advocacy – The CDMP Initiatives and the Achievements

2.2.1.1. DRR Mainstreaming in the Planning and Appraisal Process

CDMP initiated the process of Mainstreaming Disaster Risk Reduction (DRR) through a range of advocacy initiatives which include **a)** sensitization through briefing sessions, workshops, debate competitions, TV talk shows and policy dialogues with the parliamentarians, high government officials, planning officials of different ministries, departments, directorates and executive agencies; **b)** reviewing the existing mainstreaming mechanism; **c)** development of policies, toolkits and guidelines and finally; **d)** institutional capacity building through joint piloting initiatives with the respective institutional actors with technical and financial support from the project. CDMP also provided technical support to GoB in developing the policy matrix on comprehensive disaster management, poverty and growth included in the **PRSP I and II**. The Executive Committee of the National Economic Council (**ECNEC**) has taken decision to include information on disaster risk assessment and lessons learned as mandatory in National Project Planning Format. The NGO Affairs Bureau was convinced to revise the FD-6 Format to consider the relevant DRR issues to be addressed by the proposed projects. Accordingly, a proposal for necessary reforms was drafted and then forwarded to the Prime Minister's Office for approval. CDMP also developed a **mainstreaming DRR and climate change adaptation guidebook** for the planning personnel of different ministries to follow in order for ensuring the implementation of the ECNEC decision.

2.2.1.2. Promoting Media Role towards Disaster Risk Reduction (DRR)

CDMP trained about 400 journalists across the country on DRR Reporting. In different working sessions the journalists had the opportunity to share ideas, best practices and emerging issues like earthquake and climate change. Different aspects of Paradigm Shift in Disaster Management and expected role of media in making the community resilient were shared in those capacity building sessions. 30 young journalists nominated by the Department of Mass Communication and Journalism, University of Dhaka received training on Risk Reduction Feature Writing. As a follow up of this training course, they visited the CDMP's community level risk reduction interventions managed and implemented by the CDMP partner NGOs under the Local Disaster Risk Reduction Fund (LDRRF) established within CDMP. Based on their field level learnings and experiences, these trained young journalists produced development features and investigative reports which were covered by media exclusively. Strong Working Relations were developed with electronic media in ensuring their role in producing DRR focused programmeme in enhancing community resilience withenriched disaster management related information.

In 2005 the project supported DMB and MoFDM in introducing the "Disaster Management Media Award" to promote the professionalism of journalists in producing DRR Reports and programmemes both in electronic and print media. The MoFDM endorsed media award guidelines and formed a senior level selection committee. This initiative was highly appreciated by the media persons and CDMP got very positive response from all stakeholders in awarding the journalists annually. A total of 20 journalists received Disaster Management Media Award in 2006, 2007, 2008 and 2009.

As a result of the CDMP advocacy initiatives with the media the BTV introduced a regular monthly programme "**DURJOGE BANCHTE CHAI**". Every episode of this programme focused a particular area of disaster management having the participation of renowned experts, academicians and senior GoB officials. Apart from this regular programmeme, BTV also produced special programme on the theme of National Disaster Preparedness Day (NDPD) and International Day for Disaster Reduction (IDDR) observed every year during October and December respectively. The **NTV** and **Bangla Vision** produced weeklong series of discussion on seven different thematic areas of disaster management. Instead of traditional relief based disaster reporting the media also started DRR reporting and this new trend was accepted by the media houses.

A large number of audio-visual materials were produced for wider dissemination through electronic media for better understanding of disaster issues.

2.2.1.3 Disaster Management Awareness targeting the school students

Considering the global experience of much disaster vulnerability among the school students the CDMP advocacy component undertook school based information sharing programmes. National Essay and inter-school debate competitions were organized. Disaster Topics were also included in the television debate of BTV and ATN Bangla for College and University students. Thirty students were awarded for best performance in writing essay on disaster management issues.

2.2.1.4. Strengthening Information Service on DRR

Information kits on CDMP and its DRR interventions in line with the GoB vision and MoFDM missions were published and disseminated to stakeholders. An special issue of a journal **Urban Risks** was published with an aim to provide a comprehensive picture of Bangladesh urban vulnerability to relevant persons and organizations. Publication of Disaster Dictionary in Bangla (*Durjog Kosh*) in

2009 was highly appreciated by the users. An English version has also been prepared with updated information for printing.

2.2.1.5: Publication of CDMP Newsletters

The “Challenging Times”, a CDMP’s quarterly newsletter was introduced during 2008, with seven editions published and disseminated among government and NGO counterparts and donors. Each edition reported on the achievements made by the MoFDM in fulfilling the objectives set under the 5 priority action areas of the Hyogo Framework for Action. Additionally, editorials in each edition raised the key issues affecting disaster management in Bangladesh and recommended courses for action to overcome the disaster challenges the country faces. Topics as diverse as climate change impacts, ‘betterment’ strategies, contingency planning, cyclone warning systems, and stories on good practice were covered in this manner. This has been widely distributed among government ministries and departments, development and NGO partners, private and public training and academic institutions and disaster management professionals. The “Challenging Times” is making a worthy and valuable contribution to the disaster management discourse in Bangladesh.

2.2.1.6: Observation of National and International Events

CDMP Advocacy Component provided financial and professional service to DMB and MoFDM in promoting the theme of UN Declared International Days for Disaster Reduction (IDDR) and National Disaster Preparedness Days (NDPD). CDMP has been acknowledged as a partner of ISDR global campaign on “Disaster Risk Reduction Begins at School and Hospitals Safe from Disasters”. During the lifetime of CDMP I (2004-2009), the days were observed from a unified platform under the leadership of DMB and supported by all the international and national NGOs working in the field of disaster management. On the occasion of the days rallies, seminars and TV talk shows were organized as well as souvenirs were published on the declared themes which have been acknowledged as resource document on local experience of DRR in Bangladesh.

2.2.3. Capacity Building of the Disaster Management Committees

The disaster management committees (DMCs) at district, upazila and union levels established under the SOD are the key backbone of the MoFDM to drive and coordinate the disaster management related services at the local levels. The structure of the committees and their roles are defined in the SOD. During design of the capacity building programme for the DMCs a comprehensive training needs assessment was conducted which found out that most of the committee members are not well aware about their roles and responsibilities and lack knowledge on comprehensive disaster management. The DMCs usually remain active during emergencies and do not carry out any of their mandated jobs assigned during normal periods. They lack focus on pre-disaster preparedness and mitigation measures which is very vital considering the magnitude of poverty, increasing rural to urban migration and high population density and rising level of vulnerability to catastrophic disasters affecting the lives and livelihoods. The committee members are also not aware of their roles and responsibilities as well as their importance in disaster management at local level and lack knowledge and expertise in community risk assessment, development and implementation of risk reduction action plan.

Based on the training needs assessments a three-day training programme with facilitator guidebook and participant hand notes on “Introduction to Disaster Management” was developed. 11 NGOs namely BURO Tangail, Gono Unnayan Prochesta (GUP), National Development Programme (NDP), Jagoroni Chakra Foundation, UTTARAN, Resource Integration Center (RIC), Country Vision, Bangladesh Disaster Preparedness Centre (BDPC), Rangpur Dinajpur Rural Service (RDRS), Jagrata Jubo Sangha (JJS) and Gono Unnayan Sangstha (GUS) were then selected through a competitive bidding process to implement this training programme initially in the unions, upazilas and pauroshavas of 7 pilot districts.

Broad outline of the 3-daylong training programme for DMCs

- ❑ **Concept on Comprehensive Disaster Management: Programme Analysis**
 - Preliminary concept on hazards and disaster and some common definitions.
 - Difference between relief oriented and Comprehensive Disaster Management (CDM) Approaches
 - Vision, Mission and Objectives of the Bangladesh Government on disaster management.
 - National Policy Framework on Disaster Management.
 - National Implementation Strategy of Disaster Management
- ❑ **Factors Influencing Comprehensive Disaster**
 - **International drivers:** Minimum Development Goals (MDG), **International Strategy for Disaster Reduction (ISDR)**, **World Conference on Disaster Reduction (WCDR)**, United Nations Framework Convention on Climate Change UNFCCC, World Summit on Sustainable Development (WSSD), Agenda 21.
 - **National drivers:** Poverty Reduction Strategy Paper (PRSP), Standing Order on Disaster (SOD), Flood 2004 National Workshop Recommendations, National Water Management Plan (NWMP), National Adaptation Programme of Action (NAPA).
- ❑ **Development and Disaster**
 - Statement of Meaning of Development, Disaster Management and Sustainable Development, Importance of Planning for development, Risk Assessment as an integral part of Development Planning, Disaster Management and Sustainable Development, Principles of Sustainability
- ❑ **Mainstreaming Disaster Risk Reduction**
 - Meaning of Mainstreaming Disaster Risk Reduction, Elements of Mainstreaming Risk Reduction, Framework of Mainstreaming Risk Reduction, Benefits of Mainstreaming Risk Reduction
- ❑ **Comprehensive Disaster Management Model**
 - The key attributes of this model
 - Disaster Risk Reduction, Defining and redefining Disaster Risk Environment
 - Elements of Defining and redefining Disaster Risk Environment
 - Technical and traditional analysis, Climate change and climate variability impacts, Community risk assessment model, Documentation of vulnerability and risk factors, Risk Matrix, Risk Register
 - Managing Risk Environment
 - Elements of Managing Risk Environment, Risk Reduction Planning model, Steps of Risk Reduction Planning, Risk Reduction Action Plan
- ❑ **Emergency Response**
 - Steps of Emergency Response
 - Early Warning, Evacuation, Search and Rescue, Needs and Damage Assessment, Emergency Relief, Emergency Medical Care, Emergency Recovery/Rehabilitation
 - of Risk Reduction Planning, Risk Reduction Action Plan
- ❑ **Roles and Responsibilities of Disaster Management Committees (DMCs)**
 - Roles and responsibilities of DMCs

- **Community Risk Assessment Process**
 - What is CRA, Uses of CRA, Steps of CRA, Participants of CRA

CDMP then offered a 5-daylong residential ToT to the facilitators of all the selected 11 NGOs on the already developed module. The professionals from CDMP, DMB and selected master trainers from similar organizations conducted the sessions on the different topics of the course and lots of opportunities were provided to the participants to practice the different sessions of the course with critics. After receiving the TOT the partner NGO facilitators organized further TOTs at their own organization to form 2 to 4 two member facilitation team in order for implementing the training programme at the local level. With the assistance from UNOs, Paurashava Chairpersons and UP Chairpersons the facilitator team of NGOs developed the training calendar, got it approved by the Chairpersons of the respective DMCs, made a call-up notice to the DMC members and imparted the training as per the approved schedule. Monitoring of the training courses were done centrally by DMB and CDMP as well as by the NGO's own mechanism.

In 2008 the IDM training was expanded to 7 new district DMCs namely Rajbari, Manikgonj, Tangail, Patuakhali, Borguna, Barishal and Bagerhat. Specialized follow-up training in selected unions of the 7 pilot districts were also arranged in 2008-2009. The IDM covered almost 28,000 members of union and upazilas DMCs of 14 districts (Table 3).

Table 3. Training to DMCs at a Glance

Phase I (2007)							Phase II (2008-2009) – expansion, refresher and follow-ups				
Name of NGOs	Name of District	Name of Upazila	No. of unions	No. of Paurashava	Total Training courses	Total Pax. Attended	Name of NGOs	Name of District	Name of Upazila	No. of unions	Total Pax. Attended
National Development Programme (NDP)	Sirajganj	Kazipur	12	1	13	1209	Gono Unnayan Sangstha (GUS)	Sirajgonj	Kazipur	5	674
		Shahzadpur	13	1	14				Sahazadpur	4	
		Chowhali	7	0	7				Chouhahi	4	
BURO, Tangail	Rajshahi	Puthia	6	1	7	843	Rajshahi	Paba	Godagari	4	396
		Mohonpur	6	1	7				Bagha	3	
		Paba	8	2	10				Charghat	2	
Gano Unnayan Sangstha (GUS),	Sirajgonj	Raygonj	9	0	9	2070	Lalmonirhat	Lalmonirhat Sadar Hatibandha	3	6	193
		Belkuchi	6	1	7						
		Kamarkhand	4	0	4						
		Tarash	8	0	8						
		Sirajgonj Ullahpara	10	1	11						
13	1	14									
Gano Unnayan	Sunamgonj	Bishamvarpur	5	0	5	UTTARAN	Satkhira	Tala	7	3	
			5	0	5			Asasuni	3		

Sangstha (GUS),		Jamalganj Tahirpur Jagannathpur Dharmapasha Sunamgonj Sadar	7 8 9 16	0 1 0 1	7 9 9 17	2068			Satkhira Sadar Debhata Kalaroya Kaligonj Shyam nagar	4 3 3 3 3	864
Uttaran-	Satkhira	Tala Asasuni Satkhira sadar Debhata	12 11 14 5	0 0 1 0	12 11 15 5	1519		Faridpur	Bhanga Char Bhadrasan Sadarpur Faridpur Sadar Nagarkanda Modhukhali Alfadanga	3 3 3 3 3 3	655
Jagrata Juba Shangha (JJS) -	Rajshahi	Bagmara Godagari Tanore Bagha Durgapur Charghat	16 9 7 6 7 6	2 2 2 1 1 1	18 11 9 7 8 7	2024	Resource Integration Centre (RIC)	Cox's Bazar	Chokoria Kutubdia Moheskhal li Teknaf Cox's Bazar Sadar Ramu Ukhia Pekua	3 3 3 3 3 2 3	719
Resource Integration Centre (RIC)	Cox's Bazar	Chokoria Kutubdia Moheskhal i	18 6 8	1 0 1	18 6 9	1248		Sunamganj	Bishamvapur Jamalganj Tahirpur Sunamgonj Sadar Sulla Dowara Bazar Dirai	3 3 3 4 4 4	810
Gono Unnayan Prochesta (GUP),	Faridpur	Bhanga Char Vadrashan Sadarpur	12 4 9	2 0 0	14 4 9	921	Gono Unnayan Prochesta (GUP)	Manikganj	Shibaloy Harirampur Ghior Daulatpur	3 2 4 4	422
Jagorani Chakra Foundation (JCF)	Faridpur	Faridpur Sadar Nagarkanda Modhukhali Boalmari Alfadanga	10 17 9 11 6	1 1 0 1 0	11 18 9 12 6	1969		Tangail	Bhuapur Tangail Sadar Kalihati Nagarpur	4 6 2 2	450
RDRS Bangladesh	Lalmonirhat	Lalmonirhat Sadar Aditmari	9 8 8	1 0 0	10 8 8			Rajbari	Goalondo	3	231

		Kaligonj Hatibandha Patgram	107	01	108	1675					
Bangladesh Disaster Preparedness Centre (BDPC)	Cox's Bazar	Teknaf Cox's Bazar Ramu Ukhia Pekua	6 10 11 5 7	1 1 0 0 0	7 11 11 5 7	1484	Bangladesh Disaster Preparedness Center (BDPC)	Patuakhali	Kalapara Golachipa Dashmina Baufal	9 7 4 4	767
Country Vision	Sunamganj	Sulla Derai Dowarabazar Chatak	4 9 7 13	0 1 0 1	4 10 7 14	1223		Barguna	Patharghata Amtali Barguna Sadar	8 8 10	848
Country Vision	Satkhira	Kalaroya Kaligonj Shyamnagar 3 upazila	12 9 12	1 0 0	13 9 12	1205	Jagrat a Jubo Sangha (JJS)	Barisal	Bakergonj Ujirpur Agoiljhara	6 4 5	491
								Bagerhat	Sharankhola Morolgonj Mongla Rampal Kachua	4 10 6 5 2	906
Total		56 upazila	502	35	537	19458					8426

2.3. Community Empowerment

Community Empowerment was one of the CDMP's five major strategic focus areas comprised of the following inter-related elements:

- inventory of all ongoing or recently terminated risk reduction and community preparedness initiatives of major players to avoid the overlapping and identify the gaps
- documenting indigenous knowledge and good practices for replication
- Assessing the existing and future hazard risks from an all hazard perspective and development of risk reduction action plans
- Implementation of the risk reduction action plans using the Local Disaster Risk Reduction Fund

2.2.1. The Gap Analysis Study

For increased harmonization of risk reduction programmes resulting in greater awareness of, and demand for reduced vulnerability to hazards at community level, an inventory of existing, immediate past and proposed community risk reduction programmes was conducted in 2006 to provide disaster management stakeholders with an overview of the nation's risk reduction efforts.

The inventory created a comprehensive database on PPRR (Prevention, preparedness, Relief and Rehabilitation) activities by compiling information from more than 50 national level organizations, and from more than 200 district level organizations in seven pilot districts namely Cox's Bazar, Faridpur, Lalmonirhat, Rajshahi, Satkhira, Sirajganj and Sunamganj through structured questionnaire survey, agency visits and consultation workshops. The inventory shows that over 80 and 60 percent organizations work with flood and cyclone respectively, out of which 30 percent are purely government initiatives at national level whereas at district level 50 percent organizations are NGOs. Most of the organizations are engaged in addressing flood, cyclone and erosion hazards. About 50 percent government organizations are engaged in prevention activities whereas only 20 percent NGOs are involved in preparedness.

The inventory database has been expanded to incorporate detailed CRA and RRAP data conducted in 612 unions of 16 districts and included in the Disaster Management Information Network Portal.

2.2.2. Documenting Indigenous Knowledge and Good Practices for Replication

The adverse natural settings and climatic diversity of Bangladesh makes its countrymen suffer, struggle, live and adopt different practices which have been inherited from previous generations which have saved the rural people and their livelihoods from all sorts of trials and tribulations. The resilience of the people of Bangladesh from the frequent disasters is well acknowledged in different international literature. There have been growing interests to learn and practice the local and indigenous knowledge, coping mechanisms and the collective wisdom that the people of Bangladesh are carrying over generations.

In 2008, for documenting indigenous knowledge and coping strategies employed by people for hundreds of year as they strive to reduce disaster impacts, a study has been conducted in 14 districts prone to flood, flash flood, water logging, salinity intrusion, cyclone, drought and on sudden arrival and attack of wild animals. The specific objectives pursued in this research are: developing inventory of onshore coping strategies having potentials for being translated into adaptive coping among rural communities of different agro-climatic zones; capturing indigenous knowledge of early warnings and practices associated with different disaster events among the local communities; assessing the capacities vis-à-vis vulnerabilities, their risk perceptions and associated preparedness responses of the local communities to cope with pre, during and post-disaster; and finally, identify and recommend potential intervention areas to enhance community resilience and capacities in counteracting disaster situation through strengthening and replicating existing coping strategies.

The findings of the study were validated through cross-sharing with a number of academicians and experts and published in a book titled "Endowed Wisdom: Knowledge of Nature and Coping with Disasters in Bangladesh". The "Endowed Wisdom: Knowledge of Nature and Coping with Disasters in Bangladesh" explores to clear the understanding of perceptions, traditional principles and coping strategies pursued by the individuals, communities and family groups that are exposed to risks, natural hazards and climatic impacts. The focus of this research was on how traditional coping mechanisms of the rural poor function in response to continuing vulnerabilities to the livelihood systems brought about by natural hazards. In separate chapters it describes the various local and indigenous knowledge and strategies applied in regions prone to flood, flash flood, water logging,

salinity intrusion, cyclone, drought and wild life disturbances for hazard early warning, coping with disaster risks and for emergency response and recovery management. Some of the indigenous practices documented in the book are as follows:

Flood

Overall flood is the most severe hazard faced in Bangladesh. The key difficulty during times of flood for communities is access to clean food and drinking water and a ready supply of fuel. To overcome these challenges the community people raise the plinths of the tube wells so that flood water can not submerge them. They use mud stoves for cooking food and they use pieces of dried out wood, jute sticks, and shrubs, branches of trees, straws and the agricultural wastes collected at harvesting time, to store as fuel. People grow many food grains like china, kaon, maize, pera, felon, etc in different fallow and pocket lands and plant a variety of vegetables around homesteads to improve food security. The community people also adopt other livelihood alternatives such as cultivation of ground nuts, sugarcanes, onions, banana, duck rearing, conservation and cultivation of kashban.

Flash Flood

Indigenous measures to mitigate the risk of flash flood include the planting of different types of vegetation in and around homesteads and riverbanks and the adaptation of housing patterns resistant to this type of sudden onset disaster. To help ensure ensure food security in haor areas people prepare dry fish, grow vegetables around homesteads and practice duck rearing.

Water Logging

Water logging is a major hazard in four districts of the southwest Bangladesh. In Jessore and Satkhira it has become a year round phenomenon. Indigenous coping strategies have focused on adapting to this new environment through the development of alternative livelihood schemes, such as floating hydroponic agriculture. They have also utilised the kandi method for cultivation of crops in submerged lands.

Cyclone

Cyclone and storm surge are the most severe hazard in the coastal areas of Bangladesh. Cox's Bazaar is one of the most vulnerable areas of the country to cyclone and storm surge. People living in this area have adopted a unique, wind resistant, housing structure called pusher bari, and plant vegetation around their homesteads to protect them from these extreme weather events.

Drought

Good community coping responses related to drought and aridity are illustrated from different locales of Rajshahi, Nawabgonj, Naogaon, Gaibandha and Nilphamari. People grow tree species like mango, Mahogany and Jackfruit, and plants different vegetables around homesteads. This practice of homestead gardening increases moisture retention, improves soil fertility and crop yield, reduces surface runoff and thus mitigates against soil erosion. To conserve water during droughts local people in the Barind tracts build small embankments to segmenting irrigation channels. Other communities dig ponds to store water for domestic and agricultural purposes.

Salinity

The coping strategies related to salinity have been sourced from the south-west and eastern coastal areas of Bangladesh, around Satkhira, Bagerhat and Cox's Bazar. In order to ensure food security in these increasing saline conditions, communities in these areas have taken the initiative to cultivate kewra which grows well in this environment. To maintain supplies of clean drinking water they harvest rain water, preserve fresh drinking water in coastal zones, and use ring-wells. They have adopted livelihood alternatives such as cultivating shrimp, prawn rearing, crabs, salt and mat weaving.

2.3.3. CRA and RRAP

Community Risk Assessment (CRA) is a participatory process to assess community risks and vulnerabilities to major hazards and sectors, and to prepare Risk Reduction Action Plans (RRAPs) through analysing the total risk environment of a particular community or union involving the local community. Community level Risks assessment is the key to identify community specific risks and vulnerabilities and mitigate those through implementation of appropriate risk reduction interventions. Through pilot testing CDMP has developed a CRA guidebook to assist its partner organizations in the conduction of Community Risk Assessments (CRA) and development of Risk Reduction Action Plans (RRAPs). This guidebook promotes an all hazard all sector focus and incorporates the impact of climate change and use of research/GIS mapping within the hazard analysis stage. CRA uses scientific information and predictions and participatory discourses to identify, analyse and evaluate risk environment of a particular community, reach consensus amongst the community on actions that are needed to manage the risk environment. The method recognizes that the vulnerability, loss, reduction or mitigation strategy and coping mechanism vary from community to community, livelihood pattern and group to group (women, person with disability, landless, farmers-fisher folks, etc) of a same community. So it ensures representation of different occupational and other socially excluded groups and that their points of views are reflected. CRA encourages community participants to respect others' concerns. A flowchart below shows the CRA process sequentially.

Once the guideline was developed, an expression of interest was published and 12 organizations had been selected to conduct CRA at the union level. TOTs were then offered to the partner NGO facilitators who then imparted similar training to their local level staff.

CRA's were initially conducted in all the unions of the selected 7 pilot districts and compiled and consolidated to the upazila and district risk reduction action plans. The union, upazila and district risk reduction action plans were finalized through validation workshops with the concerned disaster management committee members and the sectoral experts. The process had been then expanded to 111 unions and paurashavas of 20 selected upazilas under six *Sidr* affected districts (Barguna, Jhalakathi, Pirojpur, Patuakhali, Khulna and Bagerhat) and three flood 2007 affected districts (Manikganj, Rajbari and Tangail). Thus a total of 644 Risk Reduction Action Plans (RRAPs) had been developed for 612 Unions and 32 Pouroshovas.

Figure 1: Flow chart showing major steps of CRA



The action plans made a detailed list of sectoral interventions (both structural and non-structural) to be required in mitigating risks and vulnerabilities of the area, identified the primary responsible entities and the approximate costs. Most of the activities suggested by the communities are of high cost and require a coordinated effort from the different sectoral ministries and agencies. The following table shows some example of structural and non-structural interventions documented in the RRAPs:

SL #	Example of Structural interventions	Example of non-Structural interventions
01	Household plinth raising above high flood level	Generation of income earning opportunities for the women
02	Construction of flood protection embankments	Awareness raising sessions for the community people on preparatory measures against potential hazards
03	Re-excavation of silted rivers and canals	Social forestation and roadside turfing to protect erosion
04	Installation of deep tube-wells, Ponds and Filters and rain water harvesters to ensure safe drinking water	Training on hazard resistant cropping pattern

The CRA process created opportunities for more than forty thousand community people to take part in community risk assessments, potential threat identification and suggesting suitable risk reduction interventions. More than three hundred NGO staff and two hundred & fifty Directorate of Relief & Rehabilitation’s field officers (DRRO & PIO) are trained on CRA facilitation.

Gender and Social Inclusion Framework Guidebook

The Gender and Social Inclusion Framework guidebook had been developed to ensure equal participation of people from different socio-economic and occupational groups in CRA and RRAP process. The guidebook has been developed in close consultation with those stakeholder groups who are most at risk. It has given the directives how best to analyse and manage the risk situations of the most vulnerable groups in Bangladesh. It can also be treated as a tool to increase the level of awareness and the response capacities of local communities to potential and frequent natural disasters, as well as to reduce the effects of these disasters on the most vulnerable groups such as: women, children and adolescents, persons with disabilities (PWD), religious minorities, trafficked persons, HIV positive individuals, elderly citizens, indigenous minorities, refugees and occupational minority groups. This guidebook provides guidance for disaster professionals to act in the best interests for the most vulnerable when carrying out risk management and emergency response programmes.

The book is designed to be used by (a) disaster managers to conduct specific CRAs for women, children, PWDs and socially excluded groups; (b) organisations involved in hazard management and risk reduction activities; (c) organisations involved in community based planning and management at local, regional or national levels; (d) disaster management personnel looking to assist communities in carrying out a gender and social inclusion analysis; and (e) PRA practitioners. The guidebook can help ensuring effective participation of socially excluded vulnerable communities in the disaster management process.

2.3.4. Hazard Zoning Map

Hazard Zoning Maps, containing spatial and temporal extent of the hazards, can be an effective tool for planning and decision-making for hazard management. Maps can accurately record the location of hazards, their probable severity and likelihood of occurrence, and display the information clearly and conveniently. If an area experiences multiple hazards, a Multi-hazard Map gives a composite picture of different hazard-related information reflecting variations in magnitude, frequency and spatial vulnerability. The Multi-hazard Map is therefore a useful tool for creating awareness in taking decisions for mitigating multiple hazards. It is also a comprehensive analytical tool for assessing vulnerability and risk, especially when combined with the GIS mapping.

The hazard zoning mapping was introduced by CDMP on a pilot basis for 67 unions and paurashavas in seven upazilas of seven pilot districts. The Centre for Environmental and Geographic Information Services (CEGIS) developed the maps for CDMP by using GIS techniques and geographically positioned with appropriate coordinates. Hazards are not static phenomena and hazard risk exposure changes over time. CDMP gave more emphasis on defining the risk environment through a combined methodology of blending the science with peoples' knowledge. The available published hazard maps are mainly based on some macro estimation and are not regularly updated. On the other hand, the hazard information collected from the ward and union levels through CRA process, are not scientifically proven and geographically positioned in an appropriate manner. The CRA outputs also do not consider the future hazard risks. However, HZMs are designed to reflect expected trends in natural hazards due to climate change and changes in river morphology by using prediction model results.

Depending on the hazard profile of the area there were about 10 different types of maps (***base map, multi-hazard zone map, livelihood map, community hazard map by major livelihood map, community hazard map by major livelihoods, flood map, cyclone map, earthquake map, drought map, arsenic contamination map and climate change impact map: sea level rise***) produced for the unions of a particular upazila and put into an atlas. The maps used CRA reports, available secondary historical information and prepared the base maps for validation through field survey. The base maps contained all the individual hazard information in addition to administrative boundaries, rivers, roads, settlements, public and private institutes and other relevant information of the area. The base maps were then shared with the community through Focus Group Discussion and questionnaire survey focusing on the hazard (major and minor), its spatial extent, magnitude (intensity and frequency) and their seasonality. Different colours are used in the map to show hazard intensity i.e., red for high, blue for medium and green for low.

2.3.5. LDRRF

In support of implementation of the options identified through CRA process and recorded in the union risk reduction action plans, the Local Disaster Risk Reduction Fund (LDRRF) was established within CDMP to provide with resources and financial support to broaden and strengthen the coping capacities of the most vulnerable communities to the impacts of all hazards. The essential prerequisites for grant award were that the proposed interventions must be

- linked with the RRAPs developed through CRA
- aligned with community needs
- endorsed by the union DMCs

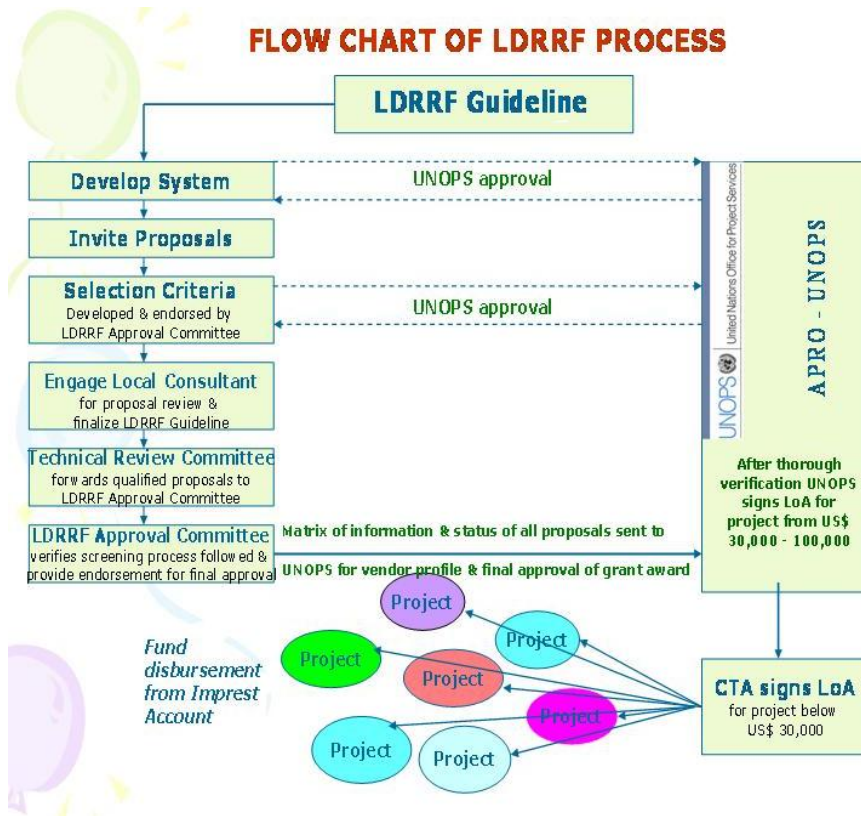
Implementation of RRAP interventions through LDRRF contributes strengthening the institutional capacity of Disaster Management Committees (DMCs) at Union/Municipality, Upazila and District levels including NGOs/CBOs making significant contribution in leadership building, encouraging proactive involvement in risk reduction initiatives at the community level and ensuring community participation. LDRRF enables Disaster Management Committees to be involved in implementing risk reduction interventions at the local level. The other important aspect of LDRRF is to encourage and establish the indigenous practices as coping mechanism.



As per the LDRRF Guideline project proposals were invited from NGOs, Academic Institutions, and Research Organizations and GoB organizations through newspaper advertisement. On receipt of proposals, they were scrutinized by the Technical Review Committee based on following the approved selection criteria. All short listed proposals were then placed to the LDRRF Approval Committee for final approval. Under the LDRRF a total of 562 Small scale risk reduction projects were implemented in 381 Unions of 11 districts.

These interventions were implemented mainly by NGOs and Union DMCs with local NGOs as their technical partners. Some research and action research projects were also implemented by

academic institutions like BUET, Department of Geology of Dhaka University, Urban & Rural Planning Discipline of Khulna University and research organizations like CEGIS, CNRS etc.



shelter; raising risk awareness among larger community and most vulnerable people and creating community volunteers; alternative livelihood options (ALO) and hazard resilient livelihoods; alternative options to ensure access to safe drinking water to reduce risk of water born diseases; action research to introduce and piloting short and early harvesting rice variety and introduction of flood tolerant agriculture produces and measures to protect crops from natural hazard; raising plinth height of houses above flood level, renovate and construction of enduring houses to reduce risk of cyclonic hazards; homestead ground raising in cluster above flood level; re-excavation of water ways for draining out surplus water, organized training for TBAs to reduce risks of mortality during child birth in remote and hard to reach areas; and protection of educational institute from river bank erosion hazards by constructing movable school.

Below Table 4 provides the details of the types of interventions implemented under LDRRF in different districts to mitigate specific hazard risks:

Table 4. Hazard specific LDRRF Interventions

Name of Hazard	Districts	Interventions for Treating Risks
Flood	Sirajganj Lalmonirhat Faridpur Rajshahi Satkhira & Jessore Barisal	<ul style="list-style-type: none"> • Raising plinth heights of 1,389 houses in cluster above highest flood level with 212 of tube wells, 744 of slab latrines, roadside plantation of 3,450 saplings, 537 nurseries & homestead vegetable gardens and 3,589 livestock/poultry as livelihood support • Construction of 30 earthen 'Killas' with 45 tube wells & 30 slab latrines • Raising 34 school/madrassa grounds to use as shelter for human and livestock • Renovation of 2 academic institutions to facilitate education system and use as shelter during flood • Construction/repair of 10,722 meter long earthen dam to protect villages from flood inundation • Construction of 4,813 meter long drainage system to allow easy flood water passage • Construction of 26 foot over bridges, Ring/Box culverts to facilitate pedestrians communication during flood season • Organized 7,980 training sessions for farmers, CRA participants & volunteers on disaster management, flood warning, rescue and evacuation • Demonstration of 81 plots on early/short variety rice cultivation • Organized 195 awareness raising sessions • Conducted 35 training sessions for TBAs • Organized 4,007 training on IGA with support (29 grocery shops, 20 bee rearing for honey, 249 swing machines, accessories among 85 boatmen and 16 fishers for open water fish farming, 370 other supports) for livelihood security • Distribution of accessories among 63 persons with disability(PwD) • Raising of 7 graveyard grounds • Installation of 23 billboards, 5,000 posters/leaflets circulated with messages on disaster management and flood early warning
Flash Flood	Sunamganj	<ul style="list-style-type: none"> • Construction of 8 village mound protection with Chailya & Bamboo • Raising of plinth heights of 363 houses in cluster above highest flood level with installation of 39 tube wells, 180 slab latrines, 11 dug wells and 1 rain water harvesting plants • Ground raising of 22 institutions for use as flood shelter and installation of 22 tube wells

		<ul style="list-style-type: none"> • Construction of 17 <i>Jangal</i> to protect Boro rice from flash flood inundation • Raising 2 graveyard ground in <i>haor</i> areas • Organized 6 training sessions on early warning, 514 training sessions on IGA with support (20 grocery shops and 30 swing machines) for livelihood security, 24 training on TBA, 172 trainings for volunteers, 1,353 awareness raising sessions for farmers and CRA participants and displaying of 3,000 posters • Developed 34 nurseries & homestead vegetable gardens • Distribution of life support accessories among 20 persons with disability (PwD) • Demonstration of 126 plots on early/short variety rice cultivation and 20 <i>Murta</i> cultivation • Development of Early Warning Systems • Circulated 30,000 posters/leaflets with messages on disaster management and early warning on flash flood
River Bank Erosion	Rajshahi	<ul style="list-style-type: none"> • Construction of 2 number of removable school houses so that schools may be shifted to other areas if eroded • Plantation of 244,060 saplings including mangrove forests • Roadside plantation of 24,900 saplings
Cyclone	Cox's Bazar Satkhira	<ul style="list-style-type: none"> • Construction of 1 cyclone shelter and drainage system for <i>Rakhaing</i> ethnic minority group • Renovation of 8 cyclone shelter in the coastal areas • Construction of 4,237 approach roads to shelters and killas • Installed 8 tube wells and 8 latrines for the Cyclone Shelter • Construction of 267 cyclone resistant houses & renovated 20 houses • Repairing of existing Pagoda as Cyclone Shelter with tube well, latrine and construction of stairs • Distributed for circulation of 14,466 posters/leaflets with messages on cyclone preparedness and disaster management
Saline Intrusion	Satkhira	<ul style="list-style-type: none"> • Construction of 15 Pond Sand Filters (PSF) • Construction of 260 Rain Water Harvesting System
Arsenic Contamination	Rajshahi Sunamganj Satkhira	<ul style="list-style-type: none"> • Construction of 12 Dug Wells • Construction of 137 Rain Water Harvesting Systems
Climate Change Impacts	Satkhira Rajshahi Sunamganj Chandpur	<ul style="list-style-type: none"> • Training and material support on IGA as alternative livelihood options • Interventions on adaptation to climate change impacts (RW Harvester/PSF etc.) • Training for farmers on Pest Management with equipment support • Established 161 compost fertilizer plants at the community level • Organized 350 sessions of training on pest management among farmers • Distribution of <i>Siraj Mixture</i> for water treatment among 600 beneficiaries to reduce water borne diseases
Tornado	Rajshahi Satkhira Faridpur Sirajganj	<ul style="list-style-type: none"> • Construction of 20 disaster resilient houses • Renovation of 81 houses to transform into disaster resilient • Organized 914 training on awareness raising on tornado and other hazards
Drought	Rajshahi Lalmonirhat Sirajganj Satkhira	<ul style="list-style-type: none"> • Plantation of 11,600 saplings to reduce the impact of drought • Distribution of agricultural equipments among 153 farmers
Earthquake and Tsunami	Cox's Bazar	<ul style="list-style-type: none"> • Organized 20 training on awareness raising on EQ & Tsunami • Development of an Early Warning System & installation of EW equipments



Table 5. LDRRF Interventions (No.)

District	Upazilas	Unions and Pourashavas	Early Warning (tick)	Training to DMC members (no)	Livelihood Training (no)	TBA training (No)	Volunteer/Farmers/CRA Participants/others Trg (no)	Awareness raising (Session)	Bill-board	Poster/Leaflet	Road side Plantation (no)	Plantation for erosion protection	Training on pest management	Nursery/Floating/Vegetable garden (Person)	Compost Fertilizer Plants	Murta cultivation	Rain Water Harvester (No)
Sunamgonj	8	68	6	0	514	24	172	1343	0	30000	0	14100	20	34	0	20	1
Satkhira	5	0	12	492	702	0	620	61	0	14466	18200	30700	0	215	143	0	394
Lalmonirhat	5	44	10	167	267	0	170	0	0	0	0	1440	0	25	0	0	0
Sirajgonj	8	78	7	0	207	35	5850	0	23	0	2000	6835	30	141	0	0	0
Farudpur	8	0	0	0	1300	0	956	126	0	4000	1450	19850	0	0	0	0	0
Rajshahi	0	188	0	0	700	0	148	3	0	1000	11600	1787	300	20	18	0	0
Cox's Bazar	8	0	0	0	320	0	270	5	0	0	6700	169060	0	20	0	0	3
Barisal	1	3	0	0	114	0	300	0	0	0	0	0	0	0	0	0	0
Jessore	3	0	0	6	397	0	0	0	0	0	0	288	0	116	0	0	0
Comilla/Chandpur	2	0	0	0	0	0	600	0	0	0	0	0	0	0	0	0	0
	48	381	35	665	4,521	59	9,086	1,538	23	49,466	39,950	244,060	350	571	161	20	398

District	Upazilas	Unions and Pourashavas	PSF/Linkage with other areas	Dug Well (No)	Tube well	Latrine	Homestead Ground Raising	Shelter Construction (No)	Shelter renovation (No)	Village protection/mound Protection	Killa construction / Institutional ground/ Market/ harvesting place (No)	Graveyard raising	Approach Road (no)	Embankment (meter)	Canal Re-Excavation? Dranage (Meter)	small scale bridge, Ring/Box culvert,	Jungle
Sunamgonj	7	68	0	11	61	180	363	0	0	8	22	2	0	0	0	1	17
Satkhira	5	0	15	0	2	30	361	0	0	0	11	0	1711	7387	1850	23	0
Lalmonirhat	5	44	0	0	18	25	199	0	0	0	8	7	0	3335	0	0	0
Sirajgonj	8	78	0	0	203	442	572	0	0	0	28	0	0	0	0	0	0
Farudpur	8	0	0	0	25	90	0	0	1	0	14	0	0	0	0	0	0
Rajshahi	0	188	0	10	17	153	40	0	0	0	0	0	0	0	2856	1	0
Cox's Bazar	8	0	0	2	1	4	0	1	7	9	1	0	1668	0	107	1	0
Barisal	1	3	0	0	1	2	0	0	0	0	0	0	859	0	0	0	0
Jessore	0	0	0	0	0	16	16	0	0	0	0	0	0	0	0	0	0
Comilla/Chandpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	42	381	15	23	328	942	1,551	1	8	17	84	9	4,237	10,722	4,813	26	17
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LDRRF Interventions (No.)

District	Upazilas	Unions and Pourashavas	Hazard Resilient house Construction (No)	Hazard Resilient house renovation (No)	Demonstration plot for Early/Short duration variety (no)	Poultry/duck/Livestock support (No of HH)	Grocery shop	Bee rearing for honey (No of HH)	swing machine	support to the boatmen	open water fish culture (No)	Support accessories to PWDs	Construction of Educational Institute	Maintenance of Educational Institute building	Distribution of preparedness/Awareness equipments	other livelihood support	Provide Siraj Mixture to reduce Diarrhoeal Disease
Sunamgonj	7	68	0	0	126	480	20	0	30	0	0	20	0	0	0	0	0
Satkhira	5	0	267	20	0	491	9	20	52	0	0	10	0	1	12	0	0
Lalmonirhat	5	44	0	0	0	201	3	0	20	0	0	53	0	1	0	0	0
Sirajgonj	8	78	0	0	0	304	0	0	15	0	0	0	0	0	0	0	0
Farudpur	8	0	0	65	81	1505	0	0	0	0	0	0	0	0	0	60	0
Rajshahi	0	188	20	0	0	326	5	0	140	60	0	0	2	0	141	188	0
Cox's Bazar	8	0	0	0	0	41	0	0	2	25	0	0	0	0	0	22	0
Barisal	1	3	0	0	0	82	12	0	20	0	0	0	0	0	0	0	0
Jessore	0	0	0	16	0	200	0	0	0	0	16	0	0	0	0	100	0
Comilla/Chandpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600
	42	381	287	101	207	3,630	49	20	279	85	16	83	2	2	153	370	600

2.3.6. Household Risk Reduction Action Planning

Downscaling CRA process from community to household level and preparing household risk reduction action plans were also one of the tasks of CDMP. The Institute for Environment & Development (IED), a national NGO was assigned to develop the household risk reduction planning template and the Bangladesh Unnayan Parishad (BUP), another NGO was assigned for implementation of the plans in 129 unions and seven paurashavas of 7 selected upazilas of the 7 pilot districts. Under this initiative the following results had been produced:

- Identified the extent and level of vulnerabilities and the livelihood and hazard related information needs of the poor and at risk communities through household need assessment survey administered on 6300 households in the CDMP's seven pilot districts
- Produced RRAPs for 2405 most vulnerable households from 24 unions of 16 upazilas.
- Provided need based livelihood support to 555 households from 111 unions (5 from each union) of 20 Upazilas under 9 districts as a demonstration. The support included distributions of cows to 157 households, goat to 84 households, rickshaw/Van to 50 households, fishing nets and boats to 32 households, sewing machine to 6 households (women) and goods for grocery shop to 14 households.
- Brick soiled 75 km of community connecting roads across 26 unions in 8 districts in order for creating new informal employment opportunities for the poorest ,
- Constructed 200 cyclone tolerant houses in 68 Unions under 4 districts and 103 flood tolerant houses in 20 Unions under 2 districts
- Installed 28 PSF and 600 DHTW and 20 RWH to ensure safe drinking water for the community people 16 tube wells in 11 unions under 3 districts
- Constructed 72 slab latrines in 38 unions under 3 districts
- Provided supportive devices to ...
- Jointly with union DMCs and most vulnerable household members organized 136 community workshops in 15 Upazilas with 3,400 participants; 45 training sessions and 40 drills, each of them with 25 participants. The awareness workshops were designed based on the livelihood security information needs identified through needs assessment survey. The information package consisted of warning on all types of disasters; dry food collection and preservation; livestock and poultry management; drought resistant crop cultivation; conjunctive use of ground and surface water; organic fertilizer use; homestead raising and repairing; salinity tolerant crop and fish cultivation; rescue mechanism during cyclone and other disasters; integrated rice-shrimp cultivation.
- Arranged 216 courtyard meetings, 48 pot songs and 96 training programmes and 24 rallies on livelihood hazard awareness

2.4. Expanding Risk Reduction across hazards and sectors

All the previous disaster management activities in Bangladesh were confined towards flood and cyclone as the two major hazards the country is frequently faced with. The design mission felt in need of expanding the CDMP focus to at least two more hazards like earthquake and climate change. Tsunami and storm surge was then added in 2006 as a post facto element of the Asian Tsunami to understand the level of country vulnerability. The country did not have much knowledge on the extent of earthquake and tsunami vulnerabilities and the climate change impacts scenario to the local economy. Therefore the sub-activities within the focus areas were mainly confined towards research and mapping, capacity building, advocacy and awareness type of activities.

2.4.1. Earthquake and Tsunami Preparedness

CDMP recognized the growing urban vulnerability to earthquakes caused by increasing population densities and unplanned development and responds to the tsunami risk. The objective within the overall framework of CDMP was to facilitate the introduction of a comprehensive geo-hazard risk reduction 'Contingency Planning' with particular attention to hazards resulting from earthquake especially in urban areas and vulnerability to tsunami in coastal areas. Aims in this particular area were to identify high risk areas based on **time predictable fault modeling the analysis of soil building interactions**; develop contingency plans to improve emergency response; develop awareness material based on outcomes of earthquake risk analysis; understand the vulnerability of areas to **tsunami and extreme storm surge events**, and prepare coastal dwellers against the impact of tsunamis.

2.4.1.1. EQ Hazard, Vulnerability Assessment and Risk Mapping

Earthquake hazard risk and vulnerability assessment in term of seismic microzonation has been conducted for Dhaka, Chittagong and Sylhet city corporation areas. The reasons for conducting microzonation are prior simulation of damages in different scenario earthquakes, distribution of damages in township areas, creating sensitization and awareness among city dwellers and decision makers and finally developing spatial contingency plans for preparedness and emergency uses against damage scenarios. Moreover, based on contingency plan equipments have been procured for Fire Service and Civil Defence (FSCD) to conduct search and rescue operations during the period of emergency.

In order to develop the earthquake damage scenario earthquake hazard maps were developed following deterministic methods. In this context, time predictable faults modeling were done through geological trenching and C14 dating. Based on different fault models, the ground shaking maps for the township area were developed in term of Peak Ground Acceleration (PGA). For assessing the vulnerability of the city infrastructures, first building inventory and other infrastructures were mapped using high resolution satellite images (Quick Bird) and corresponding field verifications. Afterwards, fragility curves were developed for the infrastructures to investigate in which PGA of scenario earthquake they withstand. Finally, the risk maps were developed using Hazard United States (HAZUS) methodology. It is to be noted that HAZUS has been modified in Bangladesh context. The major inputs for assessing hazard, vulnerability, and developing finally risk

maps were regional active fault mapping and modeling geology, geomorphology, Digital Elevation Model (DEM), engineering geology, quaternary geology, all infrastructures mapping and their fragility curves development of Dhaka, Chittagong and Sylhet City corporation areas. All the analyses have been done in GIS. Major outcomes of the assignment were earthquake hazard, vulnerability and risk assessment of the township areas which is in combination known as seismic microzonation mapping.

The outcomes were used for developing earthquake contingency plans and as awareness raising tools for the decision makers. These outcomes can be used in future for updating building code, improving detailed area plan of city corporation integrating hazard maps and developing contingency plans for more organizations based on hazard scenarios.

The main purpose of the earthquake risk mapping undertaken in the 3 City Corporations was to produce essential data to ensure that the Contingency Plans were prepared on scientifically-grounded scenarios. Preparation of such Contingency Plans was therefore the main result of the risk mapping. However, it has also produced an amount of data otherwise unavailable. Specifically:

- Engineering geological maps of Dhaka, Chittagong and Sylhet city corporations reflect the soil behavior in different dynamic forces. The ground of the cities had been characterized with respect to shear wave velocity.
- Scenario based seismic hazard maps have been developed representing Peak Ground Acceleration of the city areas for Dhaka, Chittagong and Sylhet. Chittagong appears more hazard prone than Dhaka or Sylhet.
- Building inventory maps of three cities are developed with their attributes. In Dhaka, Chittagong and Sylhet total number of different types of buildings were mapped (Dhaka 316,000 – Chittagong 180,000 – Sylhet 52,000) and are available in GIS platform with inventory of lifelines and critical infrastructures.
- Among occupancy classes in all City Corporation areas, residential class was found to have the major proportion. Their proportion was 81.3%, 81.7% and 85.2% in Dhaka, Chittagong and Sylhet, respectively.
- Among structural type of non-engineered building, brick in cement mortar masonry with flexible roof is the most common type in all cities. The percentage of this type was 42.9%, 38.5% and 59.2% in Dhaka, Chittagong and Sylhet respectively. For engineered building, C3 (concrete frame with masonry infill walls) was the most common class. The percentage of this type was about 27% in all three City Corporation areas.
- About 67% of roads in Dhaka, 79% of roads in Chittagong and 51% of roads in Sylhet were in soils with very high liquefaction susceptibility.
- Most highway bridges in 3 City Corporation areas are aseismic in design. The overlay map between liquefaction susceptibility and location of the bridges showed that there were 6 major highway bridges in Dhaka, 4 bridges in Chittagong and 2 bridges in Sylhet, which were located in moderate to very high liquefaction susceptibility area.
- Two components of railway transportation system, railway track and railway facilities, were found in 3 City Corporation areas. 58% of railway track in Dhaka, 99% of those in Chittagong

and 100% of those in Sylhet are located in the moderate to very high liquefaction potential areas. Most structure and essential urban facilities do not have a seismic design.

- Most of potable water pipelines in 3 City Corporation areas are ductile pipe. This ductile material includes galvanized iron, ductile iron, mild steel, PVC and steel. It was found that 59% in Dhaka, 86% in Chittagong and 36% in Sylhet of potable water pipeline were in the moderate to very high liquefaction potential areas.
- Most natural gas pipeline in 3 City Corporation areas are arc-welded joint steel pipe. 58% in Dhaka, 89% in Chittagong and 50% in Sylhet of such pipes were located in the moderate to very high liquefaction potential areas.

Guidelines on how to operationalize the building code during construction has been developed (BUET). Relevant engineers and inspectors received training on Building Code and critical area of inspection during construction of buildings (27 in Dhaka, 41 in Chittagong, 36 in Sylhet City Corporations).

2.4.1.2. Contingency Planning for earthquake hazards

Contingency plan is the document which is used during the period of emergency to bring the disastrous situation into normalcy within fastest possible time. Moreover, the plan dictates management of humanitarian assistance through effective coordination among major responding organizations. Earthquake contingency plan has been prepared in three levels, these are national, city corporations and agency levels. Contingency plans for city corporations includes Dhaka, Chittagong and Sylhet while agency plans are prepared for Disaster Management Bureau (DMB), Directorate of Relief and Rehabilitation (DRR), Directorate General of Health Services (DGHS), Armed Forces Division (AFD) and Bangladesh Fire Service and Civil Defence (BFS&CD), Life Line Authorities (Gas, electricity, water and telecommunications).

As current capacities in disaster management are largely centered on emergency response and post-disaster recovery, there is a need for a comprehensive geo-hazard risk reduction “Contingency Planning” strategy that is linked to a transparent implementation framework to be able to address these issues.

With regard to contingency planning, both seismic hazard and vulnerability maps have been amalgamated for assessing earthquake risks in Dhaka Chittagong and Sylhet city corporation areas. Based on seismic hazard and vulnerability maps, three scenarios (low, moderate, and high) have been developed and simulated through HAZUS software. This study helped identifying the degrees of destruction due to potential earthquake hazard. In light of the findings from the aforementioned scenarios, the Earthquake Contingency Plans were formulated at various levels.

In the preparation process of National Earthquake Contingency Plan, the ‘Cluster-based Approach’ has been adopted which particularly focus on the primal issues including overall command and coordination operations, search, rescue and evacuation operations, health services, relief services (food, nutrition and other relief), shelter (including camp management), water supply, sanitation and hygiene, restoration of urban services, transport (road, rail, air, sea), and security and welfare services.

The final contingency plan is being embedded with disaster preparedness activities, emergency response and post- disaster recovery planning based on gaps analysis. The plan would clearly define the duties and responsibilities of the professionals working in the organization to execute the

preparedness, emergency response and post disaster activities. The contingency plan will also reflect proper coordination between the agencies. The plan differentiated the city into different zones considering the intensity of the hazard and vulnerability maps. For each zone, the spatial planning for search and rescue operations and evacuation will be done under this plan. The spatial plan has shown the route of rescue operations and evacuations of the different parts of the city. The open spaces of the city has been determined to evacuate the people there and providing them with first aids. The assessment of needs for tents, foods and supporting materials in different zonal office for disaster management of the cities are being conducted under this plan.

The plan will further provide guideline to build-up international relationship for getting support immediately in case of emergency. Finally, attempt will also be taken to incorporate the land use regulation of the contingency plan into city corporations/city development agencies.

In order to develop the contingency plan, spatial database for all the infrastructures of the cities were developed as input information. These databases include hospital and clinic information, roads, gas lines, electric poles, building inventory, open spaces, surface water sources as well as inventory of search and rescue equipments. Based on these inputs, the major outcomes are the cluster-based plan in national levels, city-based plans to be handled by city corporations and agency-based plans describing what to do before, during and after the events. The cluster-based information under contingency plan is given below:

Table 6: Cluster Based Information used for contingency planning

Cluster	Indicators
Emergency Operations Cluster 1- Overall Command and Coordination	Administrative Office (DC Office, PWD, LGED, DCC, RAJUK, DMB, DRR, FSCD, RHD, DWASA, BR, BIWTC, Airport, Titas Gas. BTCL. DPDC, DESCO, TV Station, Radio Station)
Emergency Operations Cluster 2- Search, Rescue and Evacuation	Fire Service Stations, Fire Service Stations Coverage Area according to time (3min, 5 min, 10min)
Health Cluster	Hospital/Clinic (Name, No. of Doctors, Nurses, Paramedics, Address, No. of Beds, No. of OT, Pathology Lab, Blood Bank, X-Ray, CT Scan, MRI, First Aid, Dispensary, Emergency Communication, Emergency Water Supply, Emergency Gas Supply, Emergency Power Supply, Emergency Budget, Emergency Plan) Civil Surgeon Office Location
Relief Services (Food, Nutrition and other Relief) Cluster	Food Godowns Location & Capacity
Shelter (Including Camp Management) Cluster	School with Open Space, Open Space
Water Supply, Sanitation and Hygiene Cluster	WASA Offices, Water Supply Network, Pipe Diameter, Over Head Tanks, Pumps, Garage Locations, Equipments
Restoration of Urban Services Cluster	Gas (Pipe Network, Pipe Diameter, Valve), Electricity (Sub-stations, Electric Pole, High Voltage Line), Communication (TV, Radio Stations,)
Transport (Road, Rail, Air, Sea) Cluster	Road Network, Road Width, Rail Line, Rail Stations, Bus Terminals, Airport, Ferry Terminal
Security and Welfare Cluster	Police Station, Police Box
Base Data	Open Space, Restricted Area, Water Body

The database developed under this plan can be used for any development work to be undertaken in the city corporations.

It is to be noted that, the plans have been developed through interactive process by the professionals of the agencies where number of training, workshops and advocacy events were involved. The plans were varied and vetted by number of workshops. Government is now on the way to endorse the plans and implement those in organization levels. Moreover, government requested and ordered other organizations that are also related with the works during emergency period surfaced during disastrous events.

The agency plans identified the intended actions to be undertaken by the respective agency in response to a damaging earthquake. The agency contingency plans focus on the following areas:

- Identify the key resources, both human and physical, which may be available to respond to the emergency
- Identify the critical areas for immediate action
- Build and train the emergency response team in advance
- Define the general policies and approach to the emergency in advance

The consultative process being suggested in developing the agency plans would help all the players to think and act coherently as a team during emergencies. This consultative process will also help to reach to an agreement on policies as well as provide clarity on the applicability of the agreed policies and resolve contradictions that may occur. *Rapid decision making* on operational issues after an emergency is important because delays may cost lives.

The contingency planning also serves as a tool for *maintaining control over events or limiting the risk of loss of control*. Because of the scale of the problems that an earthquake may pose, it may sometimes provoke to an erratic or unpredictable response. Well-intentioned but ill-equipped agencies may rush to help, leading some agencies to over-react to the emergency. The risk of inappropriate responses is much lower when clear plans are in place. The Contingency planning process also allows identification of projected needs that may arise as a result of an emergency and the resources that will be immediately available to meet those needs. One benefit of a realistic contingency plan is that it may encourage donors and others to provide the needed resources for enhancement of resource base of the agencies involved in plan implementation.

2.4.1.3. Strengthening Search and Rescue Capabilities

The Comprehensive Disaster Management model developed and adopted by CDMP comprised of 2 major elements namely defining and managing the risk environment and emergency response management. To improve the search and rescue capabilities a MoU was signed with Bangladesh Fire Service and Civil Defense (BFS&CD) that allowed in country training of 48 FS&CD trainers in search and rescue operations. CDMP also supported 8 BFS&CD officials to attend 2-weeklong international training programme held in Singapore during 5-16 January 2009 on urban search and rescue. The course comprised of modules on Principles of Urban Search and Rescue Operations; Search and Rescue Techniques; Breathing Apparatus Proficiency Training; Fundamentals of Collapsed Structural Rescue; Confined Space Rescue; Height and Road Traffic Accident Rescue and Rescue Scenarios and Exercises. The participants gained valuable practical detailed information on updated search and rescue techniques, fundamentals of collapsed structures, confined space rescue, etc. The information acquired by the participants during this training was useful and partially inspired the organisation of the urban volunteers training programme.

The BFS&CD introduced the urban volunteer programme under the CDMP-BFS&CD partnership programme that aimed at training the community people from all sections of urban life to gain knowledge and skill on *collapsed structure search & rescue, fire fighting and first aid*. The expectation was that these trained community volunteers will play their role as effective first

responder before and after the arrival of professionals in case of any disaster especially earthquake. About 1000 urban volunteers (380 in Dhaka, 240 in Chittagong and 240 in Sylhet) were trained in batches each comprised of 40 participants on search and rescue operations as well as first aid activities. The ward commissioners were directly involved in volunteer selection, training monitoring, launching and concluding events of the training programme. The criteria used for selection of the volunteers are given below:

- be interested and willing to attend the course
- be ready to play the role as first responder/volunteer in case of any disaster
- be physically and mentally fit
- be of 18-30 years old
- be minimum eight pass literate
- be locally resided/inhabitants
- Elite group (like Doctor, Engineer, Teacher, Imam, Student, Influential person of the community)

Details of the trained volunteers have been archived in the nearby fire stations so that, in case of emergencies they can be called-upon within a short notice. The urban volunteer databases are also available in Dhaka and Chittagong and Sylhet Fire Service offices as well as in the office of the respective City Corporations.

Collapsed structure search & rescue, fire fighting and first aid
The course content:

1. Describe the principles of managing earthquake disaster
2. Provide knowledge on the organization of CLCSSR and its activities
3. Provide knowledge on the criteria of construction materials and its relation to the earthquake disaster
4. Emphasize the important factors to ensure operational safety
5. Provide knowledge and skill on searching and locating the victim
6. Provide knowledge and skill on operation, maintenance, safety precaution and trouble shooting of Tools, Equipment and Accessories
7. Familiarization with Rescue Strategies and Techniques
8. Demonstrate Emergency Rescue Methods and techniques of lifting
9. Demonstrate the knowledge and skill of First Aid and Patient Assessment
10. Demonstrate the management of Wounds and Musculoskeletal Injuries
11. Provide knowledge and skill on Fire Fighting and Evacuation

Based on the demand placed by BFS&CD the project procured and handed over a large number of search and rescue equipments (Table 7). Subsequent trainings were then organized to familiarize with the technical specification as well as their practical use.

Table 7. List of Equipments procured under CDMP and handed over to BDRCS

Sl. No.	Item Name	Quantity	Sl. No.	Item Name	Quantity
1	Fire Fighter Suit	200	17	Shaking Table	1
2	Fire Fighter Gloves	200	18	Consolidation test equipment	1
3	Fire Fighter Boots	200	19	Two wheeler water mist system.	15
4	Fire Fighter Helmet	200	20	Four wheeler water mist system	8
5	Heat Resistant Suit	60	21	Wood Circular Saw	20
6	Breathing Apparatus	50	22	Rotary Hammer Drill	40
7	PC	26	23	Rescue Jack	30

8	Notebook computer	7	24	Air Lifting Bag	9
9	UPS	26	25	Come along (3400lbs)	25
10	Printer	26	26	Search Camera	20
11	Multimedia Projector	9	27	Thermal Image Camera	16
12	Mobile phone set	263	28	Cold cut system	2
13	Cross hole/Down hole seismic system	1	29	Vibrator Heavy Duty	10
14	Soil automated Cyclic Tri-axial equipment	1	30	Air Ventilator/Confined space rescue blower.	25
15	Soil Tri-axial test equipment system	1	31	Pump Driven water Mist system	20
16	Direct shear test equipment	1			

The project also had organized three exposure trips to Nepal, Thailand, Philippines and Indonesia for 33 government high officials and technical experts from different government ministries, city corporations, and fast responding institutions. After the 2nd exposure visit to Thailand and Philippines, the Secretary, MoFDM conducted a lessons learned workshop aimed at recommending follow-up actions and disseminating the recommendations to line ministries for taking initiatives on urban risk reductions. Initiatives for enforcement of building code were taken by sending official letters from MOFDM to RAJUK and City Corporations. FS&CD is exploring the possibility of activating an Emergency Operation Centre in its Chittagong office, with the support of Chittagong City Corporation. Mayor of Chittagong City Corporation has been supportive of the initiative, pledging IT equipment. A number of policy dialogues had been organized as well as a number of drills on search and rescue in all three city corporations.

2.4.1.4. Strengthening Earthquake research capability

Earthquake vulnerability and risk assessment and mapping was a relatively new area of research for which country did not have much knowledge and expertise and also the required equipments. The project procured the below list of equipments to generate necessary data and information. Subsequent trainings were then organized for its potential user groups from BUET, AFD, GSB, BFS&CD, PWD, EED, RAJUK, and Dhaka University to familiarize with the technical specification as well as their practical use. Trainings were organized on the use of those equipments to its potential user groups. To provide hands on experience the participants were also involved in the process of data collection, analysis and preparing the vulnerability maps. At the end of the project the equipments were handed over to its future user groups.

List of earthquake research equipments procured and installed

Sl. No.	Description of equipments	Quantity (No.)	Organization received
1	Accelerometer	20	GSB
2	Seismic Shake table	1unit	Bangladesh University of Engineering and Technology (BUET)
3	Microtremor	4	Now in CDMP, after CDMP-II activities will be delivered to competent organizations
4	Cross hole/Down hole seismic system	1	Geology Department, Dhaka University
5	Soil automated Cyclic Tri-axial equipment	1	
6	Soil Tri-axial and direct shear test equipments	1	
7	FerroScan	2	Public Works Department and Bangladesh University of Engineering and Technology (BUET)

Details of the technical training organized by CDMP

Sl. No.	Title of the training	Content	# of participants	Affiliated organizations
1	Training on seismic risk assessment	Training deal with GIS and seismic risk assessment using the software Hazard for United States (HAZUS)	25	GSB, BUET, DU, DGHS, DMB, DRR, BMD, RAJUK, PWD
2	Shear Wave Velocity Determinations	PS logging techniques were used to determine shear-wave velocity for ground amplification assessments	20	GSB, BUET, DU, Roads and High Ways, EED, PWD, RAJUK
3	Active Fault Modelling	Active geological fault mapping and modeling	15	GSB, BUET, DU, BMD, Jahangir Nagar University
4	Seismic Microzonations	Develop seismic microzonation mapping based on deterministic hazard analysis	14	GSB, BUET, DU, BMD
6	Dynamic Measurement of Buildings during strong ground motion	Basic concept on Dynamic Measurement of Buildings and necessity in hazard vulnerability assessment	23	BUET, CUET, SUST, DU, GSB, RAJUK, PWD, EED

2.4.2.2. Education on earthquake disaster and safety and evacuation measures

Training for the managers of critical infrastructures on fire safety and evacuation.

The main objective of the training is to enhance the capacity of the managers of critical infrastructure who are responsible or to be made responsible to respond emergency situation with regard to fire after an earthquake. The training is designed to orient the participant about earthquake, earthquake induced fire and fire safety measures in the organization. The intended target groups of this course are the personals in the organization who works for fire safety, responsible for making overall fire safety precaution and evacuation plan.

The institutions and number of participants from the respective organization were selected considering their role in disaster management, their importance to be functional and also their vulnerability. For the TOT, total 24 participants from the **Programme for Enhancement of Emergency Response (PEER)** project were selected with the consultation of Fire Service and Civil Defense (FSCD). All the trainees and trainer for TOT were from FSCD Offices. Total 48 participants in Dhaka, 25 participants in Sylhet and 25 participants in Chittagong from different Governmental & Non Governmental institutions attained the training. A training manual was prepared and distributed among the participants.

Safety and evacuation training for school children and teachers.

The key objective is to train teachers, school staff and students on how to practice proper action and response during earthquakes. The training is deliberated to ensure the safety of students, teachers & staff during and after a damaging earthquake and to help school administrators and their disaster action groups to design a specific response plan of the school for earthquakes.

Training material for the teachers was developed and distributed. 28 schools (in Dhaka, Chittagong and Sylhet City Corporation areas; 14 primary and 14 secondary) were surveyed regarding their structural and nonstructural earthquake hazards vulnerabilities, and corresponding school evacuation plans were prepared. A total of 56 school teachers from 28 schools in Dhaka, Sylhet and Chittagong were trained and 1300 students participated in evacuation drills. Through this training the communities surrounding the schools were sensitized with regard to school safety.

Awareness and education for religious leaders against earthquake dangers.

The basic aim of this programme is to impart training to religious leaders and sensitize them with regard to public awareness in respect Bangladesh context and role of religious leaders and imams to mobilize the public before, during and after the earthquake.

Training materials /manual have been developed. Three-day ToT for the 25 selected imams was held at the training academy of the Islamic Foundation Bangladesh. 165 religious leaders from selected mosques of the three cities were trained.

Training on tsunami vulnerability for the managers of coastal infrastructure.

The training is intended to make understood the manager of coastal infrastructure about the mechanism and different physical threat scenarios with regard to tsunami and storm surge vulnerability of Bangladesh coast, and also to educate Managers and planners of coastal areas on how to utilize existing resources for reducing vulnerability of storm surge and tsunami.

Training in three different coastal cities for decision makers /planners and managers of coastal infrastructures (Cox's Bazar 35; Barisal 33; Khulna 30) were carried out. Training guidebook on tsunami and storm surge was prepared and distributed among the participants.

Education on Contingency Plans and seismic hazard maps for decision makers and planners.

The main aim is to establish link between national/city contingency plans and clarify the authorities about the responsibilities and roles of the participating agencies in an integrated, comprehensive response to an earthquake.

95 participants attended the training courses on Incident Command System held in Dhaka, Chittagong and Sylhet (participants were from Public Works Department, DMB, Directorate of Relief and Rehabilitation, Local Government Engineering Department, FS&CD, Armed Forces Division, etc.). 29 participants from WASA, Armed Forces Division, Public Works Department, etc. attended the training course on Lifeline Utilities. 87 participants attended the training courses on Simulation Exercise held in Dhaka, Chittagong and Sylhet. (participants were from Public Works Department, DMB, DRR, Local Government Engineering Department, FS&CD, Armed Forces Division, etc.). 26 participants from various GoB and academic institutions attended the HAZUS training course.

Training for masons and bar-binders.

The main objective of the training is to enhance the knowledge & skills of local masons and bar-binders about the vulnerability of earthquake in Bangladesh and necessity of earthquake-resistant construction. The training is designated to enhance the knowledge and skill of the construction

workers on earthquake-resistant construction technology and to encourage the workers for effective technology transfer and its consequences in safer construction practice.

City Corporation engineers participated in ToTs and later conducted trainings for masons and bar binders. 25 trainers trained. 162 masons residing in Dhaka, Chittagong and Sylhet City Corporation areas were trained.

Documentary on earthquake hazard and vulnerability.

Documentary has been prepared and will be broadcasted by national and private TV channels to raise the awareness about earthquake vulnerability and to practice proper action & response during earthquakes.

Posters and leaflets on earthquake vulnerability reduction measures.

A total of 75,000 posters and 120,000 leaflets were produced and distributed to aware about the vulnerability before, during and after the earthquake .

Teachers are more aware and know the way to organize school safety drills. 3 posters for schools (on school evacuation plan, school drill and school safety tips) distributed to 333 primary schools and 289 secondary schools in Dhaka, 365 primary schools and 248 secondary schools in Chittagong, 177 primary schools and 66 secondary schools in Sylhet.

City dwellers are more aware of earthquake risk. Materials on safe building and nonstructural vulnerability were also developed and distributed to relevant agencies.

2.4.2.3 Tsunami / storm surge vulnerability mapping and preparedness

With technical support from the Institute of Water Modelling (IWM), Centre for Environmental and Geographic Information Services (CEGIS) and a number of other institutions the project had conducted the study to prepare inundation risk maps for tsunami and storm surges. In order to do that, the numerical modelling of the tsunami wave from a potential source area towards the coast of Bangladesh was introduced. The entire coastal area was divided into several tsunami inundation vulnerability zones according to their degree of vulnerability. The process included preparation of the Digital Elevation Model through digitization of contour maps and land use and geomorphology maps. The results will be used to guide the construction of infrastructure at coastal regions with due consideration of plinth level heights. The study produced the following results:

- Produced inundation risk maps for tsunami and storm surges and then updated after cyclone AILA
- Identified 3 out of the 11 sources in the Bay of Bengal as tsunamigenic.
- Validated the study findings through an international workshop organized by the project and held in Dhaka in January 2009 on 'Tsunami and storm surges hazard assessment for Bangladesh'
- Based on inundation risk maps a strength and vulnerability analysis has been made on the existing formal and informal cyclone shelters and coastal infrastructures and put into a database.
- Produced spatial distribution maps in GIS format with their attributes of tsunami vulnerable schools, hospitals and other emergency response and control buildings (informal shelters) to be used the government engineering department for repairing and their further strengthening.
- Developed guidelines to improve the adaptation capacity of the tsunami and storm surge vulnerable buildings/infrastructures including schools, hospitals, and district headquarters, fire service, CPP and Red Crescent Offices and other emergency response buildings. The

guidelines is expected to be used by government agencies and NGOs to inform the people taking shelter in the identified buildings during emergency and handed over to relevant institutions.

- Provided search, rescue and first aid training to 38,600 existing CPP volunteers using the data produced on formal and informal shelters and on inundation risk maps. Also conducted 1-day orientation training to the 6,500 newly recruited CPP volunteers for the AILA affected expanded areas.
- Placed a proposal to build the future shelters following strengthen analysis.
- Conducted economic appraisal of coastal industries and the livelihood analysis based on inundation risk maps. The appraisal mapped out key livelihood generation industries of the coastal areas and analyzed for their economic contribution to GDP.
- Assessed the economic risks of the coastal industries / livelihood to storm surge and tsunami are analysed and estimated the potential losses of the sectors (crop, aquaculture, salt, forestry, livestock, commercial sectors) with reference to buildings, roads, other infrastructures in the coastal region.
- Prepared guidelines to reduce the risk to coastal livelihood and national economy for agriculture, fishery, livestock, and education sectors; commercial sectors such as manufacturing industries, business, and tourism sectors.

<i>District</i>	<i>Usable</i>	<i>Not usable</i>	<i>PEDP-II</i>
<i>Bagerhat</i>	97	12	54
<i>Barguna</i>	147	10	59
<i>Barisal</i>	37	-	15
<i>Bhola</i>	417	65	195
<i>Chandpur</i>	21	1	58
<i>Chittagong</i>	578	30	71
<i>Cox's Bazar</i>	507	10	104
<i>Feni</i>	58	13	5
<i>Jhalokati</i>	12	2	3
<i>Khulna</i>	77	2	46
<i>Lakshimpur</i>	113	10	119
<i>Noakhali</i>	250	34	16
<i>Patuakhali</i>	165	72	103
<i>Pirojpur</i>	36	1	33
<i>Satkhira</i>	65	-	16
<i>Shariatpur</i>	11	-	27
Total	2591	262	924

Existing Cyclone Shelter Information of Bangladesh

- Total formal useable cyclone shelter in the country is 2591
 - Unusable shelter is 262. Unusable means coastal dwellers did not take shelter in those buildings during last cyclones. These shelters may need dismantling or major repairing works.
- PEDP-II (Primary

Education Development Programmeme, Phase-II) consisting of 924 two story schools in coastal area made by LGED. These schools are not constructed as shelter, but coastal dwellers took shelter in those schools in the previous cyclonic events. Strength analysis exhibit that PEDP-II can not be used as shelter, as they were not constructed considering the application of live load in a certain period.

Inventory of Cyclone Shelter in the Coastal Area:

District- wise summary of cyclone shelters

Information delivered based on the survey made on 2008 -2009

Inventory of Non-formal Cyclone Shelter in the Coastal Area:

A comprehensive study has been carried out to identify the tsunami and storm surge vulnerable school/ hospital/emergency response and control buildings in the coastal region of Bangladesh and evaluate their adaptation capacity to tsunami and storm surge events. The infrastructures include school, college, madrasa, fire services, CPP offices, Red Crescent offices, emergency response and control buildings. A database has been prepared based on the field information of the infrastructure .The spatial distribution maps of infrastructure vulnerable to tsunami and storm surge, the guideline to improve the adaptation capacity of coastal infrastructure during tsunami and storm surge events, the evaluation of the adaptation capacity of the coastal dwellers to take shelters in the infrastructure during Tsunami and surge event and the structural strength analysis of the Infrastructures have been completed.

List of buildings

District	Upazila	Number of Building									Total
		Cyclone Shelter	School-cum-Cyclone Shelter	School	College	Madrasha	Hospital/FWC	D.C. Office	Fire Service	Red Crescent	
Cox's Bazar	Teknaf	5	19	18		2	2				46
	Ukia	1	11	6		3					21
	Ramu		9	12		2	2				25
	Cox's Bazar	6	22	33	3	10	2	1	1	1	79
	Maheskhali	13	27	59	8	19	7				133
	Chakaria	4	28	51	3	16	4				106
	Kutubdia	17	43	32	2	12	2				108
	Pekua	2	28	15	1	11	1				58
Chittagong	Banshkhali	18	80	147	7	22	4			1	279
	Anwara	1	29	48	4	10	3				95
	Patiya		7	81	9	5	1				103
	BandarThana		7	20	1	1					29
	Sitakunda	1	37	101	7	3					149
	Sandwip		100	183	11	17	9				320
	Mirsharai	4	16	50		10					80
	Chittagong Port							1	2	1	4
	Chandanaish		3	65	3	8	3				82
Feni	Feni Sadar							1	1	1	3
	Sonagazi		32	50		12	3				97
Noakhali	Companiganj	1	8	49	1	10	2				71
	Noakhali	1	28	62	2	9	1	1	1	1	106
	Hatiya	6	36	161	4	18	3				228
Lashimpur	Ramgati		30	85	1	11	4				131
	Lashimpur	1	8	51		4	3				67
	Raipur		2	20		2	1				25
	Kamalagar		22	55		11	2				90
Bhola	Bhola	3		107	2	5		1	2	1	121
	Daulatkhan	2		98		2	1				103
	Borhanuddin	2		96		4	1				103
	Tazumuddin	1		59		1					61
	Manpura	1		33		2					36
	Lalmohon	5		131		4					140
	Charfession	3		130		7			1		141
Barisal	Barisal			8		2	1				11
	Bakerganj			12		4	1				17
Patuakhali	Bauphal	1		69	3	26	4				103
	Dashmina	5		93	1	15	5				119
	Patuakhali							1			1
	Galachipa	20		134	5	26	4				189
	Kalapara	34		109	4	27	1				175
Barguna	Amtali	4		68	1	16	3				92
	Barguna	7		136	3	22	2	1	1	1	173
	Betagi	1		26	1	6	2				36
	Patharghata	14		133	3	17	2				169
	Bamna	3		42	3	9	2				59
Pirojpur	Mathbaria	1	11	72	4	12	3				103
Bagerhat	Sarankhola	4	20	41	3	5		1	1		75
	Mongla	2	7	21		1	2				33
Khulna	Dacope	2	14	26		1	3				46
	Khulna Sadar							1	1		2
	Koyra	1	11	13		3	1				29
Satkhira	Shymnaqar	2	8	19		4	2				35
	Total:	199	703	3130	100	449	99	9	11	7	4707

Economic Risk appraisal of the coastal industries:

The analysis of Contribution of the Coastal Industries to the National Economy (CCINE) is to identify and appraise economic risk to the coastal region (e.g. fishing/tourism industry) to tsunami/storm surge event. Along with other estimates and analyses, CCINE study presents region wide estimates of the three basic aggregates of the macroeconomic variables. These are: (1) Gross District Product (GDP); (2) Growth Rate of GDP; and (3) Sectoral Share of the Agriculture, Industry and Service sectors. The region wide estimates are done based on the estimates at the district level. CCINE represents zonal estimation of the Bangladesh economy during the fiscal years of 1995-96 to 1999-2000 as data were not available at the district level for the onward fiscal years.

Average estimate of the Gross District Product revealed that absolute volume of the non-coastal was approximately close to the coastal. Coastal and non-coastal Gross District Product was rising over the years. Comparing 1995-96 with 1999-2000, it was estimated that Gross District Product was 1.23 times higher for both regions

Coastal per capita GDP at the district level shows that there is a wide income gap. Chittagong appears to be the top in the list of coastal districts where Feni the lowest. In 1999-2000, per capita GDP of the Chittagong was 2.3 times higher than Feni.

Agricultural sector of the coastal region dominated over the non-coastal region in terms of GDP at constant prices. In 1999-00, it was 1.15 times higher than non-coast. In 1999-2000, agricultural value addition to GDP of the Chittagong district was 6.5 times higher than that of Jhalokati.

Growth rate of agricultural value addition to GDP shows that flood in 1998 struck the coastal zone more harshly than that of the non-coastal zone. Growth rate of the coastal region came down from 5.94 % (1996-97 FY) to 2.10%(1997-98) where in the non-coastal region it was 6.55 in 1996-97 and 4.06 in 1997-98. The sectoral share of agriculture shows the similar pattern for the coast and non-coast.

In 1997-98, the coastal region showed a negative growth rate in the crop and horticulture sector where non-coastal region always registered positive growth rate. The coastal region was badly hit by the infamous flood in 1998. Fishery as a sub-sector of agriculture played a very important role for the coastal region to dominate over the agriculture as a whole. Coastal region generates greater output in fisheries than the non-coastal region by a big margin.

The value of the output produced by Chittagong is around 19 times greater than that produced by Narail. Growth rate of service sector in the coastal region had been higher than the growth rate attained by the non-coastal region only in the year 1998-99.

Comparison of industrial growth rate between the coastal and non-coastal zone indicates that there is an increasing trend over the years except 1998-99. Non-coastal industrial GDP growth rate was always higher than coastal except 1998-99.

Mining and quarrying sub-section was unaffected in 1998. The value addition of the mining and quarrying to GDP by the coastal region was always higher than that of the non-coastal region. The sectoral share was only around 3.4 percent to the overall industry.

The value addition of manufacturing sector to GDP by the non-coastal region was higher than the coastal zone. But the contribution to GDP by the coastal region was higher if Dhaka city was

ignored from the study sample. The average growth rate differences of the manufacturing sector between the coastal and non-coastal region indicate that it was always less than 1 percent.

2.5.5 Climate Change Capacity Building and Adaptation

CDMP has established a Climate Change Cell (CCC) within the Department of Environment. CCC was mandated towards establishing an Integrated Approach to Climate Change Risk Management at National and Local Levels. CCC has been functioning since 2005 and acts as a secretariat to coordinate/support other national climate change activities such as preparation of National Communications, the NAPA process, and the Clean Development Mechanism. It focused on the following:

1. *Building the capacity of Government to coordinate and integrate climate change issues in mainstream development activities across government.*
2. *Strengthening existing knowledge and availability of information on impact prediction and adaptation to climate change.* This includes compiling and synthesizing existing studies, and filling some of the gaps, as well as improving information exchange between science and policy-makers
3. *Awareness raising, advocacy and coordination with partners across government, NGOs, civil society, private sector and donor organizations.* Using a variety of mechanisms and information products, the Cell is working to promote the integration of climate change adaptation and risk reduction in development activities, especially within climate sensitive sectors and the disaster risk reduction process.
4. *Improving capacity to adapt livelihoods to climate change in the agriculture sector.* Working with FAO, the cell is field-testing livelihood adaptation strategies with farmers to better respond to disasters and climate change risks. This includes translation of climate change modeling into agricultural response options and livelihood adaptation practices. The initial focus is on drought conditions, with a view to facilitating replication elsewhere.

There was a general lack of understanding and awareness of the climate change phenomenon, including what causes global warming and hence influence changes in the climatic patterns; what are the current and projected impacts, how the changing climate affects lives, livelihood, economy and overall development, who are being affected now and who will likely be affected by its adverse impacts, how to reduce disasters and manage climate risks (locally); what role can we play in climate risk management and adaptation, etc.

To facilitate adequate understanding and response action from society in preparing for climate change, particularly the vulnerable population and communities, a Baseline Study was undertaken in 2005 on Disaster Risk Management and Climate Change Impact Knowledge and Understanding among the disaster management stakeholders at various levels, The findings concluded that the understanding about climate change in general at Union and Upazila levels seems to be very poor. The study suggested for a rigorous training and awareness campaign to be undertaken by the CCC.

The CCC had established a twelve (12) member Technical Advisory Group (TAG) with the renowned Bangladeshi experts in order for guiding and selecting the priorities for the Cell. TAG assisted the Cell

in identifying priority projects for adaptation research, defining the research protocols and reviewing and validating the research outcome. TAG also guided the Cell in identifying modeling needs, designing projects and scenarios generation. Awareness and sensitizing materials development and dissemination were also guided by the TAG.

Over the past five (5) years (2004-2009), the Cell has initiated a number of activities to achieve the objectives to enable the management of long term climate risks and uncertainties as an integral part of national planning.

Mainstreaming: Mainstreaming climate change is to engage in a systematic, comprehensive effort to reduce the negative impact of climate change through integration into overall national development and planning process. Climate Change Cell promotes partnership with both GO & NGO to service long term and immediate needs. In this respect, about 61 Focal Points has been established in different ministries, government agencies, academic & research institutes.

Capacity building: Climate Change Cell promotes capacity building of Government and non-government organizations to serve long term and immediate needs. Training needs assessment for DoE and MoEF has been assessed & compiled and placed to CDMP. A training course titled 'Climate Change and Bangladesh' for GoB officers have been developed and a total of ninety (90) government officials has been provided training through three training programmes, including an orientation workshop for Focal points.

Cell also organized several training workshop for GoB officials, media professionals and other stakeholders at national and local level (**Attachment 1**)

CCC facilitated the integration of the Climate Change Cell in the internal arrangement of Department of Environment. In an order by DG, DoE on 19 March 2009, the cell have been formulated with a Director as the convener. The cell comprises of six (6) deputy directors and two (2) research officers of the DoE. The Cell will initiate, coordinate and publish all the climate change related activities of the DoE. The Cell will also provide support to the climate change related initiatives of the Government of Bangladesh.

Sharing Knowledge: Climate Change Cell compiles, generates, archives and manages data, information and knowledge and provide support and services in making knowledge based decision to all stakeholders.

The Climate Change Database not only archive data but also report and study finding in the arena of climate change.

The Climate Change Website (www.climatechangecell.org.bd) offers a pool of resources, including news on events at home and abroad, progress and achievements. The Cell has published more than 40 publications, which have been printed and widely disseminated among the stakeholders are also available in the website.

A library corner within the DoE library has also been established in the Department of Environment where climate change related documents have been archived.

Modeling: The Cell has initiated a number of activities covering climate impact prediction, projections of hazard scenarios, damage assessment, cost of the climate change etc. An institutional road map and business plan for impact prediction modeling in Bangladesh has been prepared and published. Following the guideline and business plan provided in the institutional road map Cell initiated a number of studies to improve the capacity in the arena of climate change modeling. The output/result of the initiative shall enable community and the professionals engaged in the Climate Risk Assessment (CRA) and Risk Reduction Action Plan (RRAP) process to make knowledge based (indigenous and scientific Knowledge) decisions for risk management, adaptation and climate resilient development.

Impact Prediction Modeling: The Cell in association with BUET generated rainfall and temperature scenarios for 2030-31, 2050-51 and 2070-71 (Table 8) using regional climate model named PRECIS for Bangladesh and ECHAM4 SRES A2 Emission as model input. PRECIS was found very much successful for seasonal forecasting of meteorological parameters like rainfall and temperature while monthly projections are also considerable to use with a minor limitation. Importantly, performance of PRECIS is superior after the calibration is performed with historical ground-truth data in Bangladesh. However, climate model is only an approximation of reality and therefore must be used and the results needed to be interpreted with due caution.

Table 8: Predicted rainfall and temperature scenarios in Bangladesh for 2030-31, 2050-51 and 2070-71

Year		Rainfall (mm/day)		Max Temp (°C)		Min Temp (°C)	
		Annual	Change	Annual	Change	Annual	Change
Baseline	1961-1990	6.78	-	30.18	-	21.14	-
Projected	2030	6.93	0.16	30.48	0.30	22.31	1.18
	2031	6.88	0.11	30.48	0.30	22.28	1.14
	2050	6.84	0.07	30.38	0.20	22.37	1.24
	2051	7.16	0.38	30.46	0.28	22.51	1.37
	2070	7.17	0.39	30.39	0.21	22.57	1.43
	2071	7.33	0.56	30.41	0.22	22.55	1.42

To predict the future impacts of climate change and sea level rise on monsoon flooding in different hydrological regions of Bangladesh, Cell in partnership with the Institute of Water Modelling (IWM) had conducted another a study covering Sirajganj, Gaibandha, Pabna Faridpur, Sunamganj, Satkhira and Barisal districts. Tables 9 and 10 illustrated the summary findings of the study

Table 9. Impact of climate change on flood inundated area

Upazilla	Area (Km ²)	Inundated area (>= 0.3m)		
		Average Flood (2005)	Climate Change Condition	% increase due to CC
Faridpur	2072.72	643.3 km ²	723.5 km ²	12.47
Sirajganj	2497.92	1536.8 km ²	1709.2 km ²	11.21
Sunamganj	3669.58	2722.0 km ²	2841.0 km ²	4.37
Sathkhira	3858.33	2358.3 km ²	2409.5 km ²	-
Barisal	2790.51	1802.9 km ²	1946.8 km ²	8
Gaibandha	2179.27	999.0 km ²	1129.8 km ²	13.09
Pabna	2371.50	1386.9 km²	1613.3 km²	16.33

Table 10. Change of flood level and duration due climate change (Jamuna River, at Bahadurabad Station)

Flood Event		Duration of Flood			Depth of Flood	
		Flood Level (m/PWD)			Maximum Flood level (m/PWD)	Depth Increase (cm)
		20	19.5 (Danger Level)	19		
Moderate Flood	2004	3 days	10 days		20.19	-
	2040	8 days	16 days		20.56	37
Normal Flood	2005		0 days	15 days	19.34	-
	2040		14 days	26 days	19.61	27

Capacity building in Climate Prediction Modeling: CCC supported professionals from DoE, SPARRSO, BMD, SMRC, BUET in providing training on PRECIS climate modeling. A total of 7 participants from BUET, SMRC, BMD, DoE, SPARRSO participated in different regional training workshops held in Bhutan, Nepal and UK. The trained person in a later stage contributed in climate modeling for Bangladesh through the Cell. Climate Change Cell has facilitated and supported establishment of a climate change study cell at Institute of Water and Flood Management (IWFM)-Bangladesh University of Engineering and Technology (BUET) as per the institutional road map and business plan to enable the country having expertise in climate modeling for risk reduction and adaptation to climate change.

Economic Modeling of Climate Change Adaptation Needs: Impacts in general and impacts due to climate change (and variability) on factors effecting sustainable development needs to be monetized to bring policy makers and planners on-board and provide them with an instrument that enables them in interpreting economical cost while planning development programme. In this respect, Cell initiated a study on economic modeling of climate change adaptation needs for physical infrastructures in Bangladesh, in partnership with Center for Environmental and Geographic Information Services (CEGIS).

The study developed economic model for three sectors, water management infrastructures in the coastal zone, health sector and roads and Highways. Using the model, the study revealed that the net investment cost for raising the coastal embankment for the probable Sea Level Rise (SLR) would be around Tk. 34,828 million. For transportation sector, a total of Tk. 8794 million would be required for flood-proofing of roads and highways by raising these infrastructures above the highest ever-recorded flood levels. Adaptation costs for health care, both private and public, have been estimated to be around Tk 1265 million per year.

Awareness: A comprehensive programme to increase awareness among vulnerable communities, agencies, professionals and practitioners at different level has been initiated by Climate Change Cell. Cell developed several awareness materials including Information, Education and Communication (IEC) materials (Booklets, Fact sheets, Briefing guides, Multimedia Clip, Video Documentary, Compiled Good Practices, Story/comic book, Games) for dissemination to relevant stakeholders at national and local level.

A number of various events have also been organized by the cell to raise awareness among the climate change stakeholders as well as general people about the causes and consequences of climate change and how to prepare against the adverse impact (Attachment 2).

Adaptation research: The adaptation research activities aim to contribute to better understanding of adaptation options, for sharing and uptake among relevant stakeholder groups and towards adoption and practice. Six (6) research projects has commissioned covering the area of Crop Agriculture (saline tolerant, early maturing), Crop Insurance, Gender & disadvantage groups, Health (Overall impact, Cholera). Brief summary of the researches are presented in the following table:

Title of the Research	Implemented by	Findings
Adaptive Crop Agriculture including Innovative Farming Practices in the Coastal Zone of Bangladesh	CEGIS	<p>The research was conducted in Kaliganj upazila of Stakhira, a salinity prone coastal district. Duration of the research was 21 months (Aug'06-Apr'08) covering only one full cropping session (Rabi & Kharif).</p> <p>The research revealed that salt tolerant T. Aman varieties like BR23, BRRI dhan40, BRRI dhan41 and BRRI dhan47 would be the solution to overcome the salinity impact at later stage of crop growth in the coastal regions. Non-rice crops such as Tomato, Okra and Aroid, under improved management practices with raised bed and mulch in the medium saline soils of Satkhira have high potential.</p>
Adaptive Crop Agriculture including Innovative Farming Practices in Haor Basin	CNRS	<p>Demonstration site had been set-up at the farmers' fields in Pakhner haor and haler haor in Jamalgonj Upazila under Sunamgonj District which is under serious threat of flash flood. Field activities of the research took place during November 2007 to April 2007 (one cropping season) as the duration of the research was only 16 months.</p> <p>The study demonstrated various rice crop and non-rice crops at the farmers' fields with encouraging results. Two varieties of winter rice (BR 29 with improved management of seedlings and BRRI dhan 45) with higher yields attained maturity by end of first week of April have high potential to avoid flashflood risks. Over a dozen of vegetables and spice crops performed satisfactorily and proved highly profitable which could be harvested at least a month before the current timing of flashfloods.</p>
Crop Insurance as a Risk Management Strategy in Bangladesh	DESM-NSU	<p>Considering the diversity of vulnerability contexts in relation to climate change, the research conducted in three districts, Lalmonirhat (Drought-prone area), Pirojpur (Salinity prone area), Sunamganj (Flash flood prone area), during the period of December 2006 to</p>

		<p>March 2008.</p> <p>The study analyzed how crop insurance fits in with people's livelihoods and existing risk management strategies. The study revealed that farmers' response to crop Insurance is quite positive and the conventional problems of crop insurance could be minimized by introduction of area based index, especially weather index-based crop insurance.</p>
Climate Change and Health Impacts in Bangladesh	BCAS & NIPSOM	<p>The study has been conducted in three different climatic zones representing drought prone Rajshahi district, flood prone Manikganj district and salinity affected Satkhira district of Bangladesh. Duration of the study was 8 months (August 2006 to March 2008).</p> <p>Findings of the study indicate that the changes in the climatic factors including temperature (maximum and minimum), rainfall (annual and seasonal) and salinity concentration increased the incidence of several infectious diseases such as diarrhea, skin diseases, kala-azar etc. The correlation coefficients between climate factors and health disorders, however, varied depending on locations.</p>
Climate Change and its Impact on Transmission Dynamics of Cholera	ICDDR,B	<p>Under this short duration study (8 months, Aug'06-March'07), cholera data for the last 18 years (1989-2006) from the hospital records of ICDDR,B, Matlab has been analyzed to find out the impact of climate change on transmission dynamics of cholera in Bangladesh.</p> <p>The study revealed that increase of temperature, sunshine hour, humidity and tidal height increased the incidence of cholera occurrence in the cholera epidemic region. Analysis show that rainfall and tidal height contributed to the incidence of cholera after two and three month lag time respectively.</p>
Climate Change, Gender and Vulnerable Groups in Bangladesh	BASTOB	<p>To build an information source on specific aspects of vulnerability of women and disadvantaged groups to climate change, considering the diversity of vulnerability contexts, number of study site was selected for the study featuring: Coastal Islands; Water-logging affected region; Saline affected region; Drought prone region; Flood Prone areas (Riverine Flood, Flash flood, Coastal tidal flood, Urban flood); Erosion prone areas (Coastal erosion, River erosion); and Ethnic Groups (Rakhain Garo).</p> <p>The study gathered information on impact of climate change on different ecosystem and consequently</p>

		population in and around. Analyzing the information, the adversities of vulnerable population of different geographical locations of the country were identified and pin-pointed under the study.
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Supporting international negotiation: Climate Change Cell also provides support to Government delegates to participate in the international climate talks and negotiations. The events include Conference of parties (COP), Meeting of parties (CMP), Subsidiary body for science and technology (SBSTA), Subsidiary body for implementation, Ad-hoc working group (AWG), Long term Cooperative Action (LCA), dialogues, workshops and UNFCCC meetings. Over the period of 5 years CCC has supported number of delegations including the Chief Adviser, Advisors, Secretary, Directors and Technical officers.

To capture the achievements in the last 5 years, cell has prepared several working documents, awareness toolkits, research documents, study reports and other documents in order to fill knowledge gaps in the arena of climate change and its impacts on the life and livelihoods, raising awareness among the stakeholders as well as to explore options to adapt with the climate change.

All these documents and reports have been published and disseminated with the objectives to create a link between the stakeholders working in the field of climate change risk management (Attachment 3).

2.4.5.1. Livelihood Adaptation to Climate Change (LACC I &II)

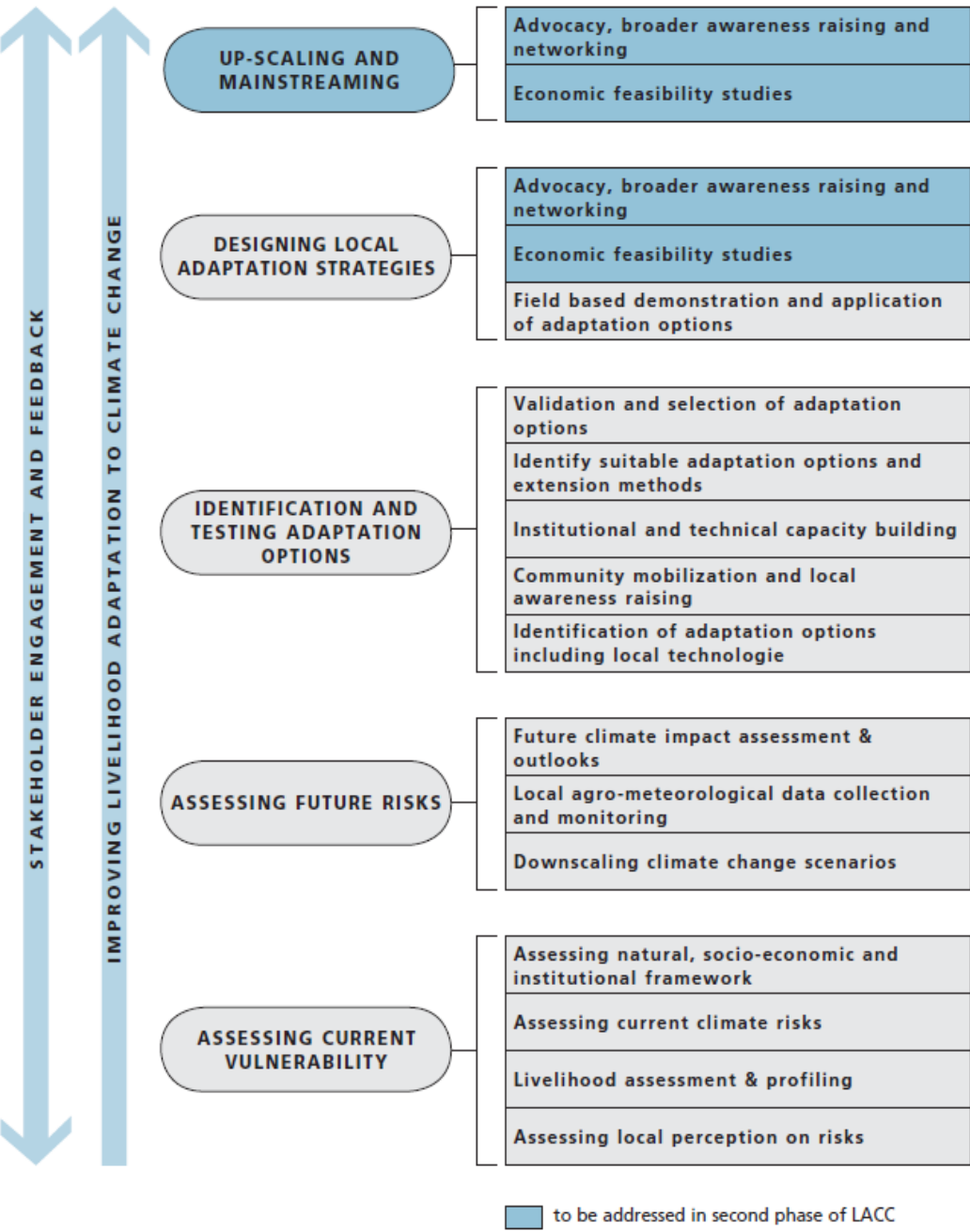
The Food and Agricultural Organization (FAO) with management support from the Department of Agricultural Extension (DAE) implemented the Livelihood Adaptation to Climate Change (LACC) sub-component of CDMP. The LACC was a two Phased project and the Phase I (2004-2007) was started in April 2004 as a small subcomponent titled “Improved Adaptive capacity to Climate Change for Sustainable Livelihoods in the Agriculture Sector of Bangladesh” (LACC I) targeting 2 drought prone districts of North West Bangladesh. LACC-II was then designed with an aim to continue testing of different livelihood adaptation options in the farmers’ field in the selected LACC I pilot locations and expand the activities to other hazard prone areas in the coastal belt. LACC II widened the focus from crops and livestock to a limited extent to include in particular bio-energy, fisheries and forestry. The project was implemented in 10 Upazilas of Chapai Nawabgonj, Naogaon, Natore, Khulna and Pirojpur districts. The objective of the project was to **introduce, improve or further strengthen disaster risk reduction and climate change adaptation capacities for sustainable livelihoods and food security in the rural sectors including crops, livestock, fisheries, forestry, bio-energy and other key factors in drought prone areas and coastal regions of Bangladesh.** The major activities implemented under this project were:

1. Capacity development of the govt./DAE officers, research institutes, NGOs, farmers and DMC members in the areas of climate change adaptation and disaster risk reduction sought to be continued in order to continually develop institutional capacity and also to provide regular support to the vulnerable community.
2. Identification, testing and replication of the good practices/adaptation options in the existing as well as new climate sensitive regions in an effort to give them the opportunities to reduce the climate change and disaster risk aiming at sustainable livelihood development.

3. Strengthen and capacitate the farmers/climate field school as a community level learning and dissemination process in the areas of climate change adaptation and disaster risk reduction.
4. Strengthen the collaboration and linkage among the community, local representatives, govt. people and research and development organizations.
5. Institution development at the grass root level and making sustainable linkage with the organization/institutes/authorities for effective collection, translation, usage and feedback on the climate forecast application for agricultural decision making.
6. Turn the lessons and recommendations into the policy action and undertake advocacy programmes at all levels in order to mainstream the climate adaptation strategies and activities in the policy.
7. Prepare and promote the long-term and planned climate change adaptation programmes applicable to the ecological sensitive areas across the sectors.

The project developed a working methodology to guide the overall project implementation (Fig. 1, <http://www.fao.org/docrep/010/i0481e/i0481e00.htm>). The methodology advocates establishment of an integrated approach to manage climate risks at the national and local levels and implement activities to promote adaptation and reduce livelihood vulnerability, particularly among women and poor communities who have the lowest capacity to adapt. After understanding the national policies related to climate change adaptation, the following working approach and processes were designed

Operationalization strategy, project components and processes for livelihood adaptation to climate variability and change in drought-prone areas of Bangladesh



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. Figure 2 illustrates the overall framework applied in selection and finalization of viable adaptation option menu for farmers.

As basis for the field testing, a comprehensive 'Adaptation Option Menu' for each agricultural season has been developed and regularly reviewed and updated through expert validations. The option menus include information about agro-ecological zones and farming systems, and vulnerability context in which options were tested, and recommend where they could be replicated. The option menus are complemented by detailed technical field implementation guidelines for each technology option. Extension officers and farmers can select good practices for replication from the menus based on the location specific conditions where they operate and implement technologies according to the detailed guidelines.

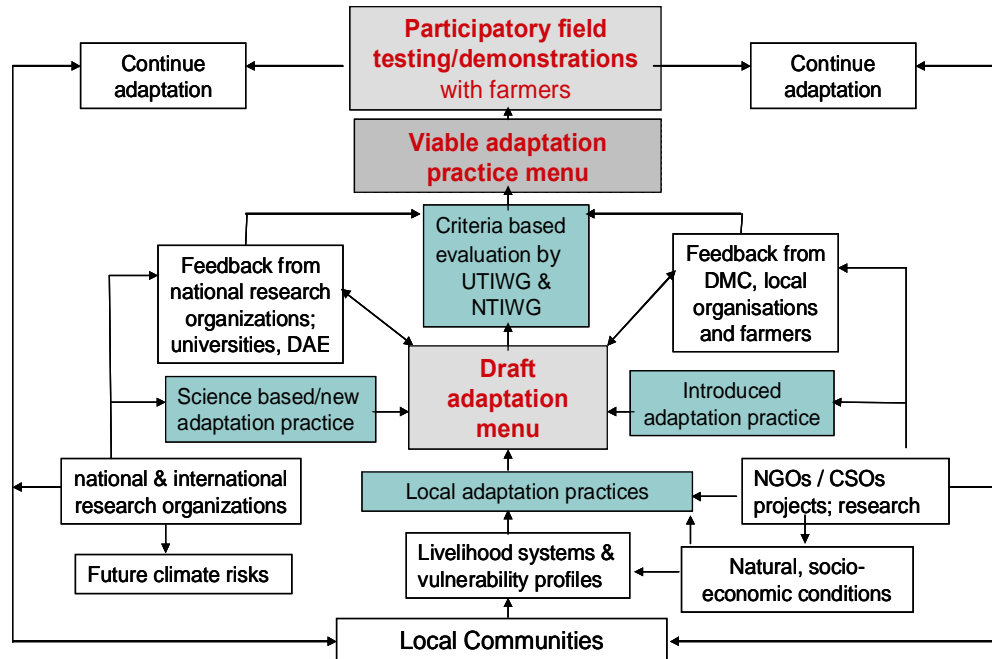


Figure 2. Overall framework and institutional structure describing activities and process of selection, evaluation and prioritization of adaptation practices for drought-prone areas in Bangladesh.







The project also developed and adopted a simple evaluation framework to assess the specific suitability for wider replication and value added of technology options in view of their potential to increase resilience to impacts of climate variability and change. The framework consists of 4 main criteria. A set of specific indicators, which are measurable at field level by farmers, was established to validate each criterion. The criteria and ratings system was applied as follows: A technology option

- Is considered suitable for field testing in the CC context : if the technology is suitable to the agro-ecological context of the site
- Is acceptable for wider replication in the CC context if, in addition to the agro-ecological suitability it is economically and socially beneficial to target communities
- Is recommended for replication in the CC context , if in addition to the above two main criteria it increases the resilience against impacts of climate hazards
- Is highly recommended, if in addition it does not increase GHG emissions.

For more details please visit

http://foris.fao.org/static/data/nrc/LACCI_evaluationframework_Cadaptationoptions.pdf)

Successful Adaptation Options

	Advantages:	Disadvantages	Farmers' Feedback:
	Mini pond - for supplemental irrigation •Minimizes crop loss and additional yield with supplementary irrigation from the mini pond during drought. •60-80 kg yield increase per Bigha (33 dec.) by using mini pond water in drought condition	Initial investment cost is high.	~10mX10mX2m or more
	Alternative crop Jujube ~In absence of irrigation facilities, most of the land fallow , jujube is a suitable alternative for land use. ~Fruit available in the lean period where very few fruits are found in the market except the imported ones.	Initial investment cost is high.	Access seed in time
	Saline tolerant Rice Cultivation ~Exploitation of the saline condition. ~Acceptable yield (+/-6 T/h)	Lodging tendency and pest susceptibility	Access seed in time
	Rice-Fish Cultivation – for higher productivity ~Same land for double yield ~Availability of protein.	Higher initial investment	Land selection in the upsurge free area.
	Farm yard manure – for soil health improvement ~Can use in the vegetable garden and the crop field ~It saves money from using chemical Fertilizer.	Higher initial investment especially for making shed.	Regular Maintenance
	Improved stove – for household energy saving Fuel save – up to 30% . ; Time save -up to 35%. Saves money; Emit less CO2.	Higher initial investment.	Low cost materials.

The project conducted 65 training sessions for its different stakeholder groups and the sessions were attended by 2154 individuals (Table 11). It also had organized 310 validation workshops with farmers and members of its different committees at village, upazila and central levels (Table 12). A total of 160 social mobilization and awareness raising events were organized which were exposed to 35,750 farmers and the community people (Table 13).

Table 11. Capacity Building Activities

Level	No. of Training		No. of participants		Stakeholders
	LACC-I	LACC-II	LACC-I	LACC-II	
UPAZILA	10	50	300	1500	Farmers, DMC Members
DISTRICT	2	6	52	160	DAE, other Departments
NATIONAL	2	3	48	90	DAE, Res. Org., Others
OVERSEAS	0	1	0	2	DAE Senior Officers
Research Org.	1	0	4	0	BARI and BRRI
TOTAL	15	60	404	1750	

Table 12. Adaptation Options Validation workshops

LEVEL	No. of Workshops		No. of participants		Stakeholders
	LACC-I	LACC-II	LACC-I	LACC-II	
Village	60	180	1200	3600	Farmers
Upazila	4	60	200	1500	UTIWG Members
National	1	5	30	150	NTIWG Members
TOTAL	65	245	1430	5250	

Table 13. Social Mobilization and Awareness Raising Activities

Name of events	No. of Events		No. of participants		Stakeholders
	LACC-I	LACC-II	LACC-I	LACC-II	
Farmers Orientation Meeting	4	10	100	250	Farmers
Farmers Field Day	8	100	800	10000	Farmers and community
Farmers Learning Exchange Visit	4	10	200	500	Farmers
Folk Song	4	20	2000	25000	Community
TOTAL	20	140	3100	35750	

An information kit in Bangla for farmers, previously produced by DAE and FAO under the ‘Support to the strengthening of disaster preparedness in agricultural sector project’, was updated and reprinted in 20,000 copies (and distributed to farmers).

The major economic benefits of the project as recorded in its terminal report were:

- The adoption of rain water harvesting and supplemental irrigation during drought in Kharif 2006 improved the rice yield by 23% and net profit by 75%.
- Water saving irrigation practice increases the water use efficiency of rice by 20%, but yield and economic advantage is marginal due to low cost of water.
- Adoption of improved stove at household level requires an investment of US\$ 10/household, while it saves 30% fuel use and reduces 35% time for cooking.

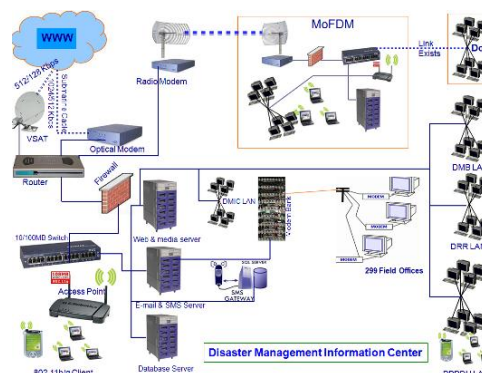
2.5. Operationalizing Response Management Systems

This particular focus area had two complementary objectives of (a) enhancing disaster management coordination through improved facilities and information sharing capacities of Disaster Management Information Center (DMIC) during normal and emergency period and (b) Establishing an end-to-end Disaster Management Information Network (DMIN that links the Disaster Management Information Centre (DMIC) portal with local institutions and urban and rural community users exposed to an identified subset of risks. For achieving the goal it was necessary to find out the current gaps in terms of organisational capacity and needs. Accordingly a nation-wide needs assessment was conducted along with ICT strategy which was then converted into activities described below:

2.5.1. Establishing DMIC at the Disaster Management and Relief Bhaban and strengthening the ICT infrastructure of the MoFDM

The establishment of a National Disaster Management Information Centre (DMIC) linked with all actors and sectors from the national down to the community level, is a key instrument in CDMP strategy to complement, if not replace, the Emergency Operations Centre (EOC) of MoFDM. The goal of DMIC is to put in place a more effective and better coordinated information management system, aimed at improving interagency coordination at all levels with access to appropriate, timely and accurate information before, during and after emergency situations. The EOC of MoFDM is ill-equipped and lacks adequately skilled professional staff and mainly depends on district and upazila authorities to report critical information for decision-making using traditional communication methods that delay response.

To understand different stakeholder needs for disaster management information, their willingness to share the information they have, and their ICT capacity to receive, use and send information, CDMP conducted a need assessment survey in early 2006 and had consultations with national, local and community stakeholders. The assessment focused on five major hazards of the country – cyclone, flood, earthquake, erosion and drought. The survey was participated by staff of the MoFDM and its departments (Directorate General of Food, DMB, DRR, and CDMP's implementing partner institutions). Primary data providers, donors, government agencies with roles and responsibilities in the SOD, major NGOs, and other users of disaster management information also participated in the survey.



The assessment examined stakeholders' risk reduction, emergency response and long-term recovery activities for their information needs. The assessment team also analysed GoB policy and procedures for disaster management, and mapped out the information flows specified in the SOD. They identified linkages among GoB agencies reflected in SOD requirements to maintain communication between respective emergency control rooms, and met with CDMP component managers to understand their needs for DMIC support.

The assessment identified differential information needs and the ICT capacity to implement the e-governance objectives of the GoB and suggested a set of functions and a number of information products for DMIC to meet stakeholder needs in order for achieving the Bangladesh's disaster management objectives.

Table 14. DMIC functions

Mode	Phase	Function
Risk Reduction	Daily use	SOD, directives and SOD-required outputs online Historical hazard/disaster incidence and impacts database Knowledge base of best practices for disaster management Repository of disaster management literature Training resources: materials, lesson plans, computer based training (CBT) modules Maintenance of information sharing MOUs Information quality assurance CDMP component / GoB / NGO communication support DMIC user directory / contact / expertise lists Portal features: news feeds, forums, alert subscription tools
	Preparatory	Risk assessment tools and status Emergency response readiness plans and status Rescue equipment inventory Relief resources availability Institutional capacity status
Emergency Response	Response	Hazard warning analysis and dissemination Loss (deaths, damage, etc.) reporting and analysis Relief needs (water, food, shelter, medical), availability and accounting Emergency response coordination Internal DRR operations Multiple GoB agencies and NGOs International response: Global disaster alert coordination system (GDACS)
	Recovery	Resource requirements, availability and accounting Agricultural inputs, credit, infrastructure, health, reconstruction materials Central relief management information system for MoFDM Other agencies' recovery programmes status

Source: CDMP-DMIC Needs Assessment Survey Report, 2006

Table 15. Proposed DMIC information product and media

Hazard	Information Products	Media
Cyclone	<ul style="list-style-type: none"> • cyclone shelter locations and capacities • relief material inventory • early warning map with probable storm path and vulnerable upazilas • damage reports • rehabilitation resource inventory 	<ul style="list-style-type: none"> • web • web • web, e-mail, fax, TV • e-mail, fax, courier • web
Flood	<ul style="list-style-type: none"> • flood shelter locations and capacities • relief material inventories • early warning water level predictions • damage reports • rehabilitation resource inventory 	<ul style="list-style-type: none"> • web • web • web, e-mail, fax, TV • e-mail, fax, courier • web

Hazard	Information Products	Media
Earthquake	<ul style="list-style-type: none"> vulnerability maps building quality assessment database emergency equipment status situation and damage reports rehabilitation resource inventory 	<ul style="list-style-type: none"> web web web e-mail, fax, courier web
Erosion	<ul style="list-style-type: none"> vulnerability maps of infrastructure and probable bank line movement 	<ul style="list-style-type: none"> web, e-mail, courier
Drought	<ul style="list-style-type: none"> computer model that analyses location variables including rain forecasts, irrigation resources, soil types and crop requirements for water, to predict drought 	<ul style="list-style-type: none"> web, offline computer
General	<ul style="list-style-type: none"> disaster management knowledge base training materials resource directories emergency response coordination tools early warning/alert subscription 	<ul style="list-style-type: none"> web SMS, e-mail, IVR

Source: CDMP-DMIC Needs Assessment Survey Report, 2006

As part of implementation of the DMIC ICT Strategy developed through this stakeholder survey DMIC was established in the Disaster Management and Relief (DMR) Bhaban by installing and configuring the necessary hardware and software. It has established a Local Area Network (LAN) in the whole DMR Bhaban for seamless data sharing with the link departments DMB and DRR and provided broadband Internet for wider information access. The same activity has been taken for MoFDM and part of the Directorate of Food.

2.5.2. Establishing 64 district DMIC and 235 upazilla DMIC sub-centre and linking them with the DMIC

After establishing the DMIC at the central level it has created DMIC sub centres at the 64 districts DRRO and 235 high risk upazilla PIO offices. Each of the sub-centres was equipped with a Computer, a black and white Printer, a Fax Machine, UPS, Scanner, Photocopier and Wireless Internet connection. All the sub-centres are now connected with the DMIC for information sharing.

2.5.3. ICT training to the MoFDM officials

Use of ICT was very limited within the MoFDM and its field offices due to the lack of ICT knowledge and equipment and ICT training. A need assessment was carried out to find the ICT training needs of the MoFDM official and accordingly a TOT was designed and conducted for the MOFDM and its departments' ICT professionals.



Later on the TOT participants were utilised to conduct ICT skills training along with outsourced ICT training providers. 200 PIOs and 64 DRROs as well as 80 DMB, DRR and MOFDM staffs were trained on ICT. Twenty meteorologists from the BMD were trained on DMIN portal. On-site training on the use of internet and e-mail provided to 235 Upazila and all 64 district offices.

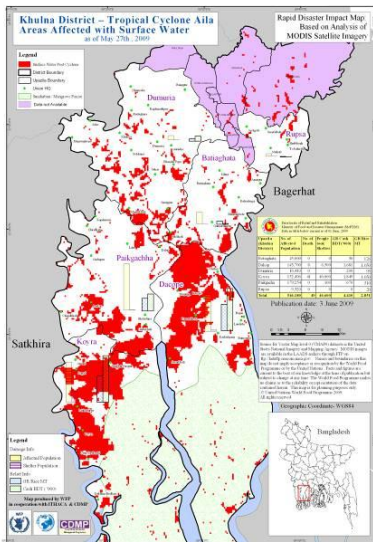
2.5.4. Establishing a GIS unit within the DMIC

A GIS unit had been established at the DMIC and installed a number of hardware and software to archive different types of data as given below:

Hardware and software installed in GIS Unit	Types of data archived in GIS Unit
<ul style="list-style-type: none"> • Large Format Plotter (48") • Large Format Scanner (48") • Laser Color Printer (A3) • Handheld GPS • Server • Desktop PC • Laptop • ArcGIS Server 9.3 • ArcGIS Desktop 9.3 • ENVI • ArcPad • Linux • MapServer • SDE • PostgreSQL/PostGIS 	<ul style="list-style-type: none"> • Administrative Boundary down to Union Level • Road Network • River Network • Cyclone Shelter • Primary School • Growth Center • Small Hat/Bazar • BMD's Met Station Loc • BWDB Water Gauge Loc • Quick Bird Image of Dhaka/Chittagong/Sylhet

The GIS unit established Centralized Server-based Geo-databases for the whole country up to Union level which are now available at CDMP. Gradually the database will be integrated within the map server of DMIN portal so that people who will have access to the internet can download those maps.

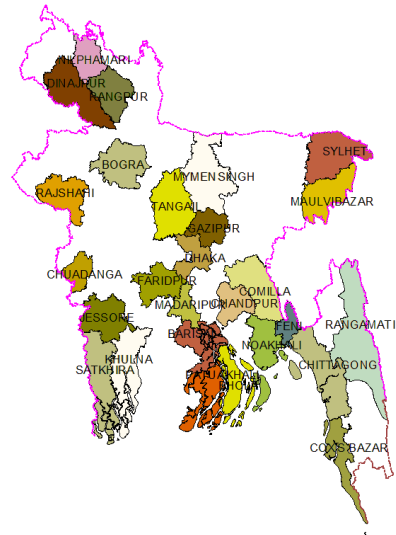
The unit also supported the CDMP implementing partners in a number of occasions. To name a few: thematic maps; Disaster Incidence Database, GIS based Household Risk Reduction Programme Management System, GIS based data management system for identifying cyclone shelters with relevant attributes, GIS based data management system for managing CRA outputs; GIS based HZMs, etc.



2.5.5. Strengthening Early Warning Capabilities

CDMP signed a Memorandum of Understanding with the Bangladesh Meteorological Department (BMD) and established communication networks with all its 35 met observatory stations. As per the agreement CDMP upgraded all stations and replaced the SSB based data transmission system to the internet based data acquisition system.

These stations are now computerized to fetch real time data from the stations. To ensure wider access of weather related information to the people CDMP assisted BMD in designing and development its website which is being frequently updated (www.bmd.gov.bd). In return DMIC availed the permission of utilizing its early warning information to its more than 500 stakeholder organizations and the user groups.



Strengthening the emergency response capability of CPP

CDMP supported the Cyclone Preparedness Programme (CPP) with hardware and software to improve the community alerting capability of the organization as well as the programme volunteers. The hardware support included:

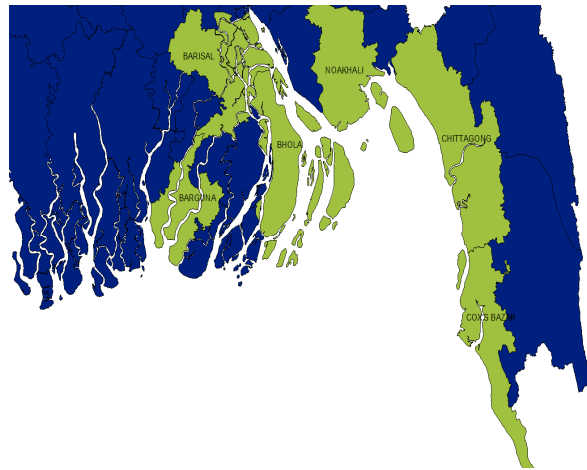


Table 16. Equipments to CPP

CPP	
Items	Qty
Notebook	1
Printer	7
Photocopier	1
Fax	6
BTTB Connection	6
Brand Computer	9
UPS	9
LAN	1
Life Jacket	1500
Rescue Kit	500
First Aid Bag	500
Solar Pannel	30
Super Mega Phone	259
Hand Siren	500
Torch Light	500
Transistor Radio	500

The CPP unit offices staff were provided with two ToTs (3-daylong Introductory Disaster Management Training course and 2-daylong tsunami early warning training course) to further rolled out within their volunteers. As mentioned in section 2.4 CDMP also provided one day orientation on tsunami and earthquake search and rescue to 38,500 of CPP volunteers. CDMP also supported development of 6,500 new volunteers for the SIDR and Aila hit coastal districts. The CPP volunteers took part in different early warning drilling organized and supported by the project.

2.5.6. Designed and developed web based ICRRP database

The Information on Community Risk Reduction Programme (ICRRP) database was developed based on the results of the gap analysis study described in 2.3.2 and then further expanded creating the scope for geographical expansion as well as extracting the CRA outputs from CRA reports and inserting those in the database. The study initially produced a GIS based prototype MIS for helping the planners and decision makers to fetch the different summarized information on organizational capacity and Prevention Preparedness Response and Reconstruction (PPRR) activities. The database was then converted into the web based format for easy access to all as well as for their updating by the disaster management stakeholder organizations. Some features of this database are:

- Receive and store disaster related data.
- Use the system collaboratively with various entities like NGOs, donor organizations, etc.
- Use historical data to do analysis and forecasting.
- GIS interface that can be used to monitor different activities all over the country.
- Application over the internet, so that more entities can have easy access
- Compact package, so that many users can have easy access to relevant data.

2.5.7. Designed and developed web based Disaster Incidence Database

This “Disaster Incidence Database”, is a GIS based open source database having PostgreSQL in the back- end and a Web GIS interface in the front-end. It is to track disaster event and store relevant information on disasters in Bangladesh and make it accessible online (www.dmic.org.bd/didb).

The database is an interactive web-based system and consists of a tabbed interface, including tables, dynamic query and maps. The data cannot be imported but full event report area available as well as the original report of data source. The number of disaster records in the database is 76 (at national level). There is no specific definition for each of the disaster type mentioned and the list is essentially based on the GLocal IDentifier Number (GLIDE) initiative¹. In the database, an ID number is used to identify a disaster event, which is composed by: the disaster type code (i.e. FL), 4 digits for the year (2008) and 4 digits for the ID number (0008). At the current stage, the information is entered in the database at a national level but CDMP is planning to enter also the information at sub-national levels.

2.5.8. Designed and developed web based DDIS

This Disaster Damage Information System (DDIS) database application is used to collect damage information (usually Form-D) from upazilla, district and national levels. Once data is entered at the lower level it aggregates and archive in a database. This software is customizable and possible to create any type of form to collect data through a web interface. There are some in built templates included within the application to be readily usable for disaster. Other features of the system include disaster event searching, reporting, BBS data, form creator, system customization etc.

1.1

1.1 ¹ The GLocal IDentifier number is a globally common Unique ID code for disasters. The components of a GLIDE number consist of two letters to identify the disaster type (e.g. EQ - earthquake); the year of the disaster; a six-digit, sequential disaster number; and the three-letter ISO code for country of occurrence. So, for example, the GLIDE number for West-India Earthquake in India is: EQ-2001-000033-IND. (source: www.glidenumbers.net)

Home Change Password Help Log out User: Rezwan

- Incident
- Disaster Data Entry
- " All Documents
- " My Documents
- BBS Data
- Reports
- Form Creator
- Configuration

Form Answer

District : Shatkhira
Incident Name :20080730
Form Name :Flood Damager Repor- 2008

No.	Question	Answer	Unit
1	Name of the District	Satkhira	
2	No of affected upazilla	1	
3	Affected area 552	25.00	sq. km.
4	Affected Pourashava	0	Number
5	Affected Union	1	Number
6	Affected family	3599	
7	Affected People (Total)	17995	
8	Damaged Crop (Full)	0	Acre
9	Damaged Crop (Partial)	827.45	Acre
10	Damaged households (full)	382	
11	Damaged households (partial)	711	
12	No of death	0	
13	No of livestock death	0	
14	Affected Road (Full)	5	Km
15	Affected Road (Partial)	12	Km
16	Affected Institution/Infrastructure(Partial)	0	number
17	Affected Institution/Infrastructure(Full)	0	number
18	Affected Embankment(Full)	0	Km
19	Affected Embankment(Partial)	5	Km
20	Affected Bridge / Culvert	0	Number
21	No. of Shelters	0	Number
22	No of People in Shelter	0	Number

Figure 2: DDIS- Data entry

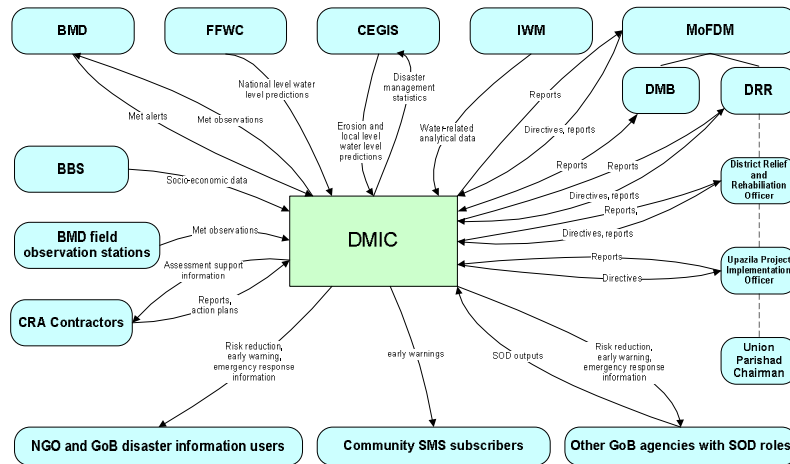
2.5.8.1.1. Designed the guideline for CRMIS software

The relief information of the Directorate of relief and Rehabilitation (DRR) are currently maintained and stored by manual process. To electronically track the record MoFDM decided to establish a Central Relief Management System (CRMIS) with support from CDMP. A detailed guideline on the software was developed to include the following functionalities:

- Store policies and workflows for different types of relief distribution.
- Store information about relief and donations received from various entities and organizations.
- Store information about allocation of funds in different sectors.
- Workflow for relief requisition and dispatching.
- Track distribution of relief.
- Store relief inventory information.
- Maintain procurement-expenditure register/leisure.
- Reporting.

2.5.9. Designed, developed and installed the DMIN portal

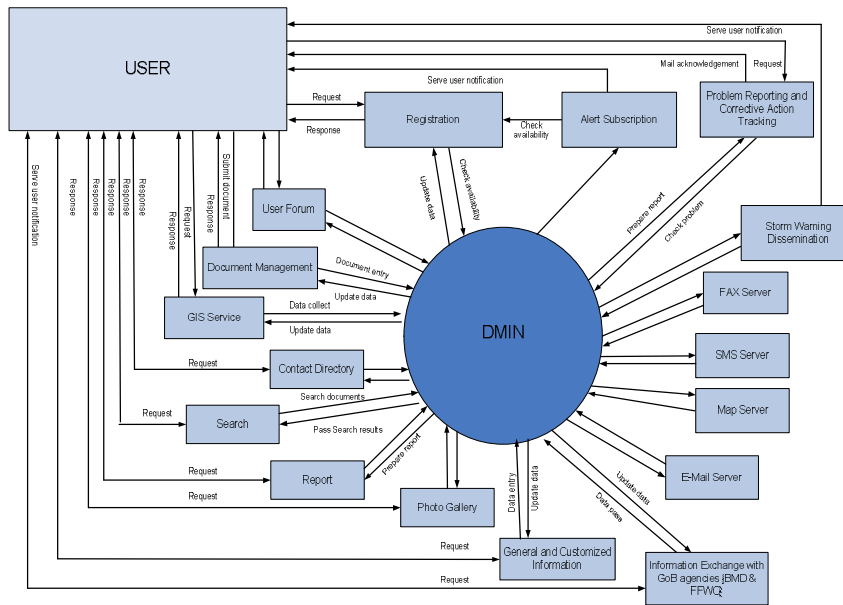
This Disaster Management Information Network portal is to share, coordinate and disseminate disaster management information, programmes and guidelines from source down to the last mile. It will enable DMIC to collect, analyze and disseminate information for risk reduction and emergency response. This web portal will establish data



communication network to link the DMIC with government agencies, NGOs and other organizations concerned with disaster management at the regional, national and local levels through its various functionality. The web portal will be an organized common platform to capture, organize and share the knowledge of disaster management and to create a versatile interface among policy-makers in the Government and disaster manager's at all administrative levels.

A Disaster Management Network (DMIN) web portal developed for sharing and coordinating disaster management information as well as early warning messages with the following features:

- ❑ Organisation/User registration
- ❑ Alert Subscription
- ❑ Discussion Forum
- ❑ BMD Bulletin Dissemination System
- ❑ FFWC module
- ❑ GIS Map Server
- ❑ SitReps
- ❑ CRA and RRAP reports and databases
- ❑ EQ and Tsunami risk databases and scenario maps
- ❑ Cyclone centre database with evacuation path
- ❑ Inventory of Community Risk Reduction Programmes (ICRRP)
- ❑ Climate Change Database (CCDB)
- ❑ Disaster Damage Information Database (DDIS)
- ❑ Disaster Incident Database (DIDB)



2.5.10. Prepared and disseminated Situation Reports (SitReps) during disaster period

The capacity of the DMIC had been well utilized during disasters especially at the time of last flood and cyclone. From June 2007 SitReps were issued from the DMIC at frequent intervals for different types of hazards. About 237 daily SitReps, containing updated information on early warning, rainfall and river situation, flood forecast information with 72 hours lead time, 24 hours weather forecast, agro metrological forecast, data on district level damage and loss and emergency response by the government, other national and international organizations, were prepared and disseminated to over 500 recipient organizations and concerned stakeholders within Bangladesh and abroad during disaster including four major disasters like flood (two phases in 2007), *Sidr* (2007) and *Aila* (2009) from 2007 to 2009 (soft copies of all the reports are provided in the CD which are also available at www.cdmp.org.bd).

III. The Financial Progress

CDMP Phase I was launched with 10 components and a total development budget of US\$14.444 million which included contribution of UNDP (US\$ 6.34 million) and DFID (US\$ 8.104 million). The project was designed with built in flexibility for other interested donors to join during implementation. As part of that provision in 2006 the European Union joined the programme and contributed another Euro 8.9 million. The GoB contribution to the project was comprised of providing of free office space for the Policy, Programme and Partnership Development Unit (PPDU), paying of CD VAT for the internationally procured items, actual cost of fuel, and electricity and telephone bills of PPDU. As of December 2009 the project had delivered 99.43% of its development budget. The remaining US\$ 147,683 will be used to clear the pending bills of a number of vendors including paying of the post adjustment benefits of the international staff.

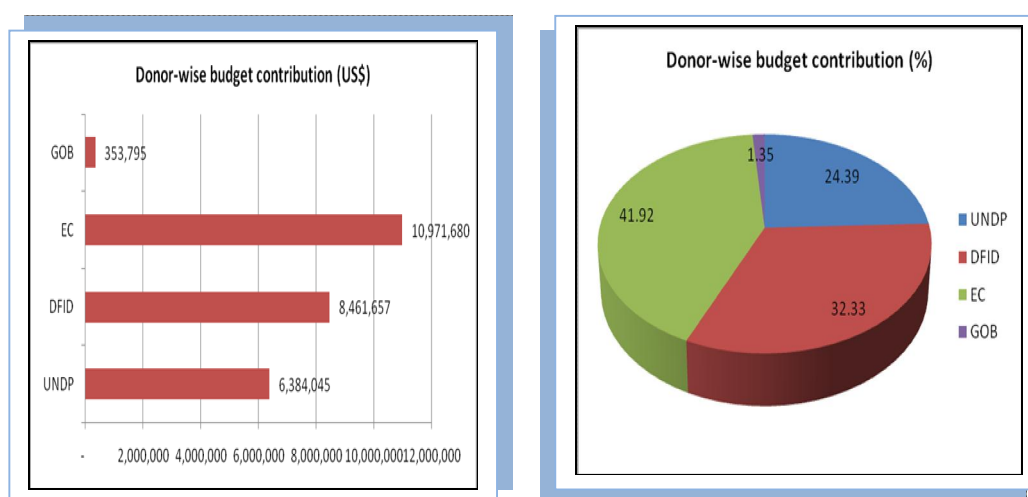


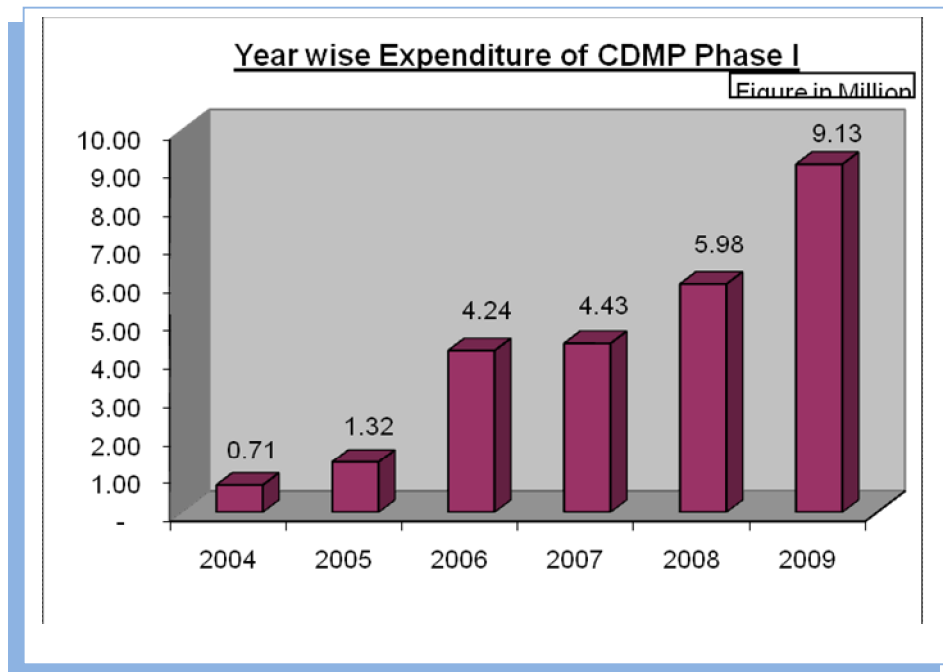
Table 17. Component-wise Financial Progress of the project

Component	Budget as per Revised TPP (US\$)	Actual Expenditure (US\$)	Achievements (%)
1A	4,184,642	3,378,994	80.75
1B	1,122,229	964,401	85.94
2A	376,933	237,428	62.99
2B	1,698,142	1,681,203	99.00
3A	53,445	58,182	108.86
3B	747,420	636,543	85.17
3C	4,207,383	4,599,547	109.32
3D	3,021,727	3,633,807	120.26
4A	5,019,296	5,948,097	118.50
4B	2,132,120	2,141,154	100.42
5A	1,251,854	1,404,977	112.23
5B	2,149,874	1,133,048	52.70
Total DPA	25,965,065	25,817,382	99.43
GoB	689,559	356,560.13	51.71
Grand Total	26,654,624	26,173,943	98.20

CDMP I was a nationally executed disaster management programme and its main focus was the community people. The CRA process introduced by CDMP had placed enormous demand from the community and other disaster management institutional actors for some small scale risk reduction interventions. The flood 2004, 2007, cyclone *Sidr* and Aila had also added to that pressure of reallocating resources from the software type of activities towards more tangible risk reduction interventions. Therefore with necessary approval some internal rearrangements had been made within and between the component budget line items which reflected in the actual expenditure of different components. Major shift had been made from the advocacy and awareness type of activities towards more community risk reduction interventions (component 3c and 3d). A significant portion of the budget was utilized to improve the ICT capacity of the GoB (component 5a) and also for search and rescue equipments (component 4a).

The year-wise expenditure

The project took 12 to 18 months time to put in place its operational and management structure like recruitment of project staff, establishment of the project office, development of guidelines and manuals, selection of implementing partners and establishment of technical and operational committees. Therefore, the real field level implementation started from 2006 which clearly reflected in the below graph.



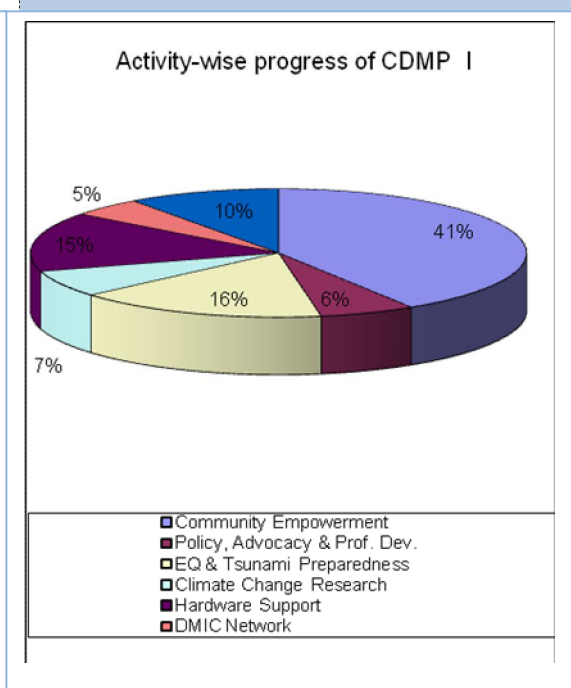
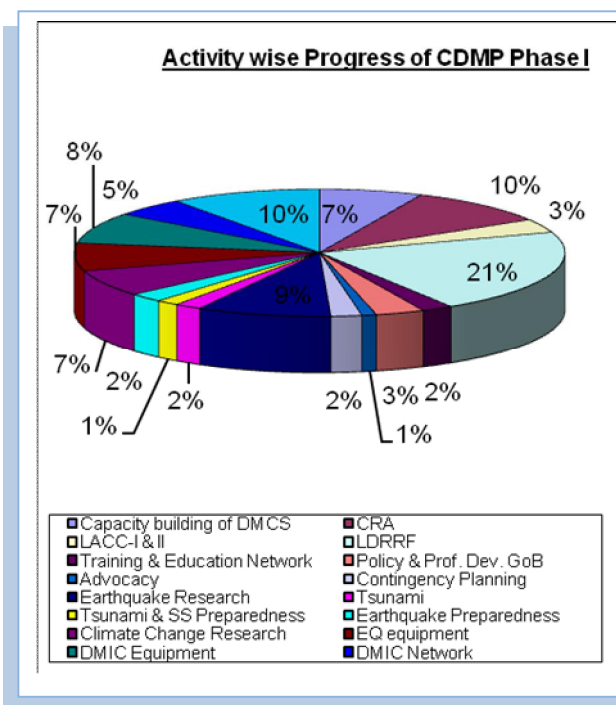
The Programmatic Achievements

Around 41% (US\$ 10.59 million) of the total DPA budget were utilized for the benefit of the at risk communities of 16 districts where CDMP's field level activities were implemented. The second major priority area was earthquake, tsunami and storm surge preparedness for which 16% of the total resources were utilized. Although CDMP was a technical assistance project almost US\$ 3.86 million (15%) were utilized to support the Bangladesh Fire Service with some search and rescue and fire fighting equipments and also to strengthen the country's early warning and community alerting

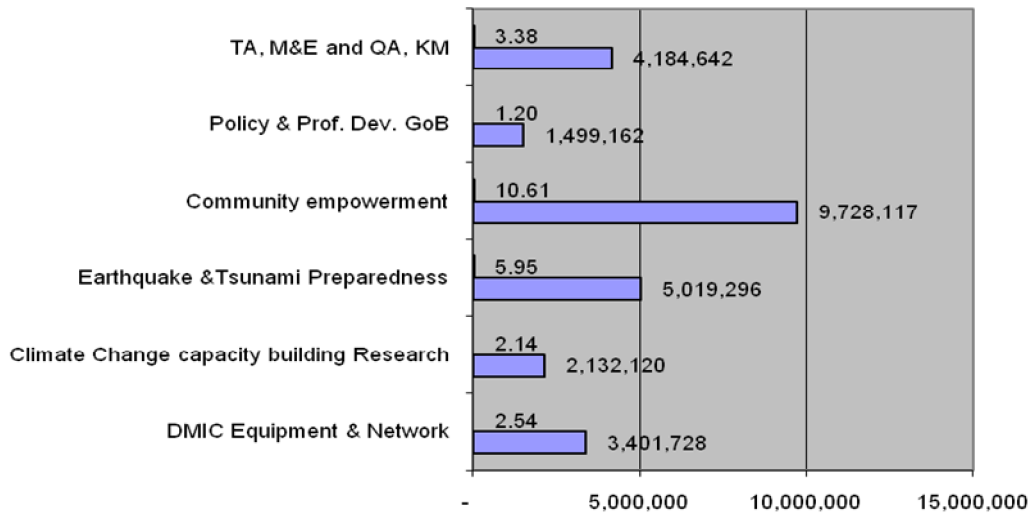
capabilities with ICT and network support to the regional DRR and CPP offices and BMD's observatories. The technical assistance to the project including salaries and benefits of the project staff, monitoring, evaluation, quality assurance and publication and dissemination of knowledge products accounted for only 10% of the total expenditure.

Table 18. Programme Activity-wise Expenditure

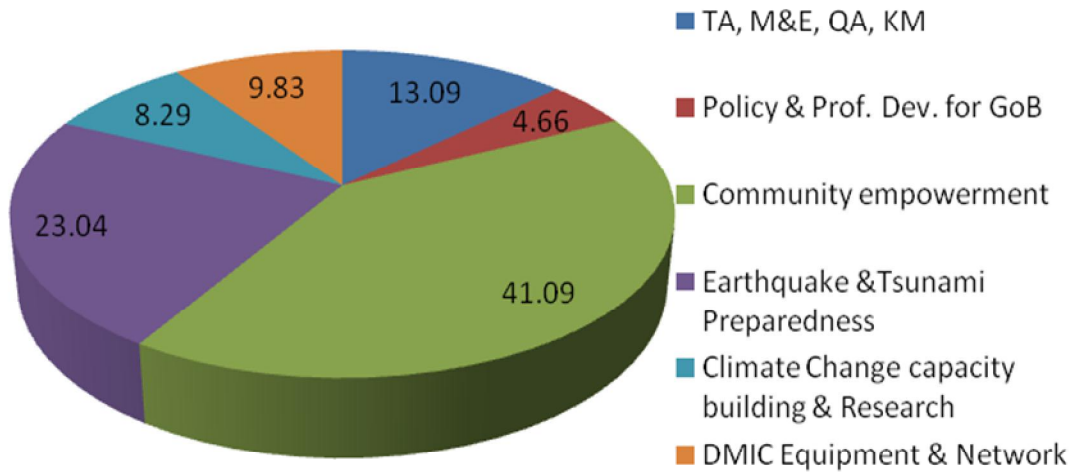
1	Capacity building of DMCS	1,755,265	Community Empowerment	10,591,898
2	CRA	2,465,414		
3	Livelihood Adaptation to climate change (LACC-I & II)	891,682		
4	Local Disaster Risk Reduction Fund (LDRRF)	5,479,536		
5	Training & Education Network	530,099	Policy, Advocacy & Professional development	1,605,310
6	Policy & Prof. Dev. GoB	827,323		
7	Advocacy	247,888		
8	Contingency Planning	523,034	EQ, Tsunami and Storm Surge Preparedness	4,221,177
9	Earthquake Research	2,278,493		
10	Tsunami	457,611		
11	Tsunami & SS Preparedness	385,533		
12	Earthquake Preparedness	576,507	Climate Change Research	1,738,546
13	Climate Change Research	1,738,546		
14	EQ equipment	1,828,303	Hardware Support	3,874,255
15	DMIC Equipment	2,045,952		
16	DMIC Network	1,218,315	DMIC Network	1,218,315
17	TA, M&E and QA, KM	2,567,880	TA, M&E and QA, KM	2,567,880
	Total	25,817,382	Total	25,817,382



Activity-wise expenditure (2004-2009)



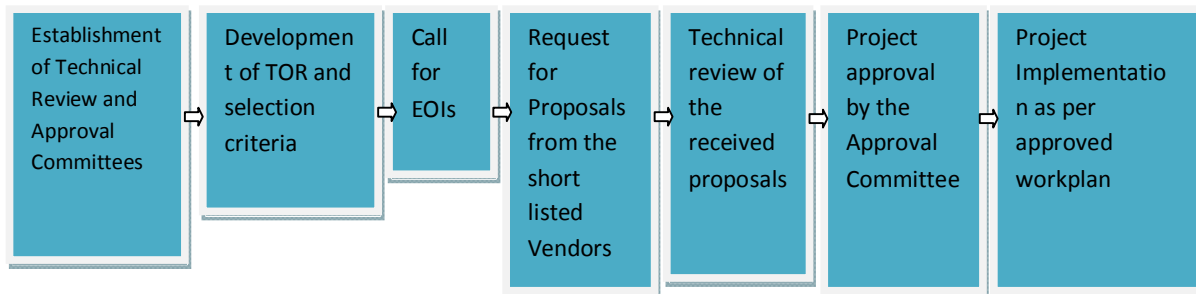
Expenditure against key programmatic areas



IV. Programme Management, Monitoring and Quality Assurance

CDMP was a technical assistance project aimed at laying the foundations for achieving a paradigm shift in disaster management from the conventional relief and response to a more comprehensive risk reduction framework and culture. This was a nationally executed project jointly administered by MoFDM and UNDP and followed the relevant GoB and UNDP administration and management procedures. The Secretary, MoFDM was the National Programme Director and also the Head of the Project Steering Committee. In 2008 MoFDM appointed DG, DMB as the Deputy Project Director for day to day operational and management support. The Chief Technical Advisor assumed the delegated from NPD responsibilities to manage the approved project activities on his behalf. The project also adopted a decentralized management mechanism where the Component Managers were tagged with their institutional supervisors. They had also enjoyed the operational flexibility to adjust the workplan in order for ensuring timely and quality delivery. The project also had established a number of Technical Advisory Groups to guide, support and validate especially the earthquake and tsunami and climate change adaptation research and piloting. The groups were represented by specialists, the civil society representatives and the respective government institutional actors.

The CDMP activities were mostly implemented through a subcontracting arrangement. The sub-implementing agencies were selected based on an approved procurement procedure as described in the NEX Manual.



The project followed the established GoB and UNDP's mechanism for overall policy and operational monitoring and feedback. The project went through annual evaluations from the donors (DFID, EU and UNDP). In 2007 a joint mid-term evaluation had been carried out by the UNDP, DFID, EC and GoB and drew a conclusion that the **project was comprehensive, had created strong ownership within MoFDM, and had successfully laid the groundwork for the required paradigm shift. It had demonstrated the potential for up-scaling to a national level.**

The joint donor-government Terminal Evaluation and the IMED Project End Evaluation undertaken in November-December 2009 and February-March 2010 respectively documented substantial contribution of CDMP I and recommended for the 2nd Phase.

V. Lessons Learned

Professionalising the Disaster Management System

The National Education and Training Network has made substantial progress in improving the quality and availability of disaster management training in Bangladesh and should be expanded.

The introduction of DM courses in public training institutes and academies has been largely successful, and strong consideration should be given to expanding this aspect of the programme to further mainstream DM. To ensure sustainability of the network, it should continue to be designed as to be ultimately owned and managed by relevant GoB agencies.

Some specific recommendations in this regard are the following:

- The number of partners and area of partnerships should be expanded. Research grants should also be made available to participating universities for them to be able to continue their training programmes, with further resource material developed.
- Dialogue should be promoted between CDMP, the University Grants Commission and universities themselves to explore practical options for a system of structured GoB subsidiary budget allocations. This would establish a mechanism to ensure the sustainability of the network.

Future training courses at graduate and post graduate levels should be increasingly focused on the demands from the DM sector. To that end it is recommended that CDMP should undertake a form of market demand analysis to improve the quality of the training graduates receive and prepare them for the demands of the working world.

E-Learning tools must be fully developed as part of the strategy to expand the national network.

E-Learning offers an excellent way to expand training and education on DM issues throughout the country, particularly in tandem with the rollout of computer equipment and internet connections under the Disaster Management Information Network. Effective feedback systems for the e-learning courses must be developed to ensure trainees are retaining the information being disseminated.

Mainstreaming and Capacity Building

Media campaigns must be widespread and sustained, using all forms of media. Media coverage on disaster management and risk mitigation remains sporadic in many instances. Long term campaigns covering television, radio, print and internet mediums should be planned and implemented. The Ministry of Information should be closely engaged as part of this strategy to improve the speed at which the information is disseminated and ensure the effort is sustained.

Capacity building of DMCs must be an ongoing activity with an even greater focus on vulnerable groups including women, children, the elderly, and people with disabilities. Capacity building of DMCs must be expanded across the entire country, with a system of periodic follow up training. Renewed focus must be given to vulnerable groups in the training. Despite the training given during Phase I many local governments still view the risks facing vulnerable groups as a niche concern rather than one of their primary issues. One idea that should be explored is the possibility of providing financial incentives to DMC members taking part in the training in order to maximise participation.

Community Empowerment

Without the support of District Commissioners the mainstreaming process suffers considerably. Such is their power at the district level that upazila and union officials find it extremely difficult to talk to DCs, let alone engage them in the CRA/RRAP process. To overcome this impediment the MoFDM must play a greater role. The issue needs to be given extra gravitas so that the DCs respond. The DG, and perhaps one or two distinguished people acting in roving roles, must actively promote this plan at the district level and engage the DCs.

CRA facilitators in NGOs have not always been particularly effective in their role. There must be a renewed focus on building their capacity but the partners that are simply not performing should be removed. A significant number of NGOs should be given refresher training on the lessons learned from Phase I. It should be ensured that there are adequate provisions to employ plenty of staff to carry out monitoring and evaluation activities. The expansion taking place in Phase II combined with mainstreaming efforts will require a considerable number of people to monitor.

The development of the district RRAP was a slow and ad hoc process. District RRAPs must be designed so that they look like a government project document. This makes it easy for district officials to send them to the national level. The design must be familiar to national level officials as foreign looking plans are unlikely to be used or even read.

CRA are often still too infrastructure focused, despite efforts to make people and livelihoods must more of a concern at the local level. The interests of marginalised people are not always reflected in the final RRAP. The full incorporation of the social and gender inclusion framework into the CRA will help to right this imbalance, but it is vitally important that partners are trained and have a full understanding of these issues. Strategies to improve child participation will also need to improve. Significant capacity building activities will need to take place.

Coordination between CDMP components, particularly in terms of linking climate change and UDMC capacity building to the CRA process reduced the potential impact these separate projects could have made. Coordination with relevant UNDP clusters and projects was also lacking. Cross cutting issues such as climate change and capacity building need to be firmly linked to the CRA process, with close coordination between teams working on separate but closely related programme

outcomes. Closer partnerships will also allow CRAs to access more scientific data, such as climate change models, greatly improving the quality of RRAPs.

The CRA process was often too dependent on NGOs in many areas. This diluted the impact of the resultant RRAP, as it reduced the level of which UDMCs and UzDMCs “owned” the plan, creating barriers to the tool being mainstreamed. It is also a lost opportunity to build the capacity of DMCs to carry out their designated functions. Local government must be more heavily engaged in the CRA process, with NGOs operating merely as technical support rather than running the process themselves. Problems related to a lack of capacity could potentially be overcome in many ways by ensuring capacity building activities for DMCs are tied closely to the expansion of the CRA process and LDRRF programme. The government must also be given more credit for the leadership role it is playing in these issues – partner NGOs must be aware of this new emphasis. A key criteria for partner selection must be their experience working and liaising with local government.

CRAs in phase I lacked uniform protocols in many areas including: appropriate partner selection, dealing with partners; conducting CRAs, implementation of RRAPs, monitoring and evaluation visits. There was also an absence of protocols on the formation of strategic partnerships. An absence of protocols regarding strategic partnerships also limited up scaling opportunities to expand CDMP DRR models to non-CDMP areas. A comprehensive set of protocols must be established at the outset of Phase II to ensure a uniform approach is adopted for the programmes expansion. Allowing different areas of Bangladesh to simply form ad hoc systems will make the CRA process extremely difficult to monitor and administer. If separate RRAPs cannot be easily consolidated and compared the potential for them to guide national policy making will be limited.

Managing far flung project areas centrally from Dhaka proved to be highly costly and inefficient for Phase I. It also limited the quality of supervision and support provided to DMCs and field interventions, and resulted in only a very weak system of M&E. Given that the number of project areas is set to greatly increase under Phase II, a de-centralised support system is needed. Base stations should be established at District government headquarters with a comprehensive M&E system in place.

LDRRF guidelines have proven to be too narrow given the diversity of challenges presented by Bangladesh's risk environment. More also needs to be done to secure the participation of experts in LDRRF Technical Review and Approval Committees and Project Implementation Committees to improve the quality of DRR interventions. The LDRRF guidelines need to be revised at the outset of Phase II to incorporate new options and criteria for entity selection. The ToR for Technical Review and Approval Committees should incorporate a provision to grant allowances to members for their expert contributions. Project Implementation Committees should always have at least one technical expert as a member – paid with a retainer fee to ensure their involvement and transparency. This change to PICs was already piloted by Component 3d in Phase I with considerable success.

Expanding Risk Reduction

Expansion of Technical Advisory Groups. The incorporation of Technical Advisory Groups (TAG) to oversee project outputs and ensure quality control was an extremely successful practise in Phase I that should be expanded to other outcome areas in Phase II where possible. It would also be beneficial to create an ‘oversight’ TAG covering many outcome areas, attended by one member from each project TAG. This oversight committee would facilitate the linkages between projects in separate outcome areas and could deal with any crosscutting issues.

Additional diversity in makeup of Technical Advisory Groups. In Phase II it should also be ensured that each TAG is made up of a diversity of experts. Phase I TAG members were typically all high profile, older professionals who were not necessarily on the cutting edge of research. TAGs in Phase II would likely be improved with the addition of younger researchers to ensure a broad spectrum of expertise and experience is included in the group.

Increased focus on mainstreaming products covering seismic hazards. Phase I of CDMP saw the development of many high quality products designed to improve preparedness and response capabilities to seismic hazards. A key focus for Phase II must be the mainstreaming of these products into the disaster management system. For example time constraints limited the extent to which responding agencies have been trained in preparing and responding to earthquakes, using the contingency plans and databases developed for them. Phase II must ensure that organisations are maintaining these resources themselves, and that their usage becomes second nature rather than an exceptional event. This will likely require additional training programmes on GIS techniques, data maintenance, and emergency response.

Full assessment of technical data is required before projects commence. Geotechnical data to be used in project outputs, such as building inventories, digital elevation models, ground water maps , building surveys and City Corporation ward need to be fully assessed and have their quality assured from the outset of Phase II. In Phase I, data that was expected to be usable in seismic risk assessments had to be discarded midway through the project because of quality issues. A full assessment at the beginning of the project can save significant time and resources later on.

Terms of reference for technical activities must include very clear methodological instructions. To avoid confusion and ensure quality of outputs, terms of reference for technical activities must include very clear and straightforward instructions on methodology. In Phase I for example, the procedures given for seismic microzonation studies included unnecessary steps and occasionally obscure explanations for detailed processes. Ensuring that the terms of reference are clear from the outset will avoid these issues.

More rigorous selection of Sub-Implementing Agencies. A more comprehensive process of selecting and monitoring Sub-Implementing Agencies should be established in Phase II. In Phase I it was found that some agencies were using unqualified staff to implement activities rather than the accredited professionals named in the technical proposal. Other agencies lacked a permanent office setup, again contrary to the information provided in their technical proposals. Additional time and resources must be allocated in Phase II to ensure agencies are fully capable of meeting the claims they make in their submitted proposals (including physical visits to their office).

More comprehensive MoUs with government and research organisations. Memorandums of Understanding reached with government and research organisations must be rigorously checked and sufficiently detailed, especially those regarding provision of equipment by CDMP. It must be ensured that such equipment is used for its intended purpose only, and certainly not for any commercial reason. There has also been reluctance in the past from some organisations in maintaining the equipment provided. Provisions must be included in the contract agreement to safeguard the usage of equipment and ensure it is maintained, with clear directions as to the outcome if these conditions are not followed.

Education programmes must be expanded to cover all organisational and community sectors. Given seismic hazards pose risks for everyone it should be ensured that earthquake education programmes reach all sectors of the population. A noticeable gap in earthquake training in Phase I for example was that specialist training for religious leaders it was only carried out for those of the

Islamic faith, with those from minority religions ignored. Education programmes in Phase II that target the general population as a whole must be designed in such a way as to reflect the diverse population of Bangladesh.

Urban risk reduction extends beyond seismic hazards. Urban disaster management in Phase I focused almost exclusively on seismic hazards, largely ignoring the risks posed by landslides and floods in urban areas. To ensure an all hazards approach is adopted in Phase II these must be included in any urban risk management strategy.

Need for a standardised procurement evaluation process. Phase I activities were hampered by the lack of a standard technical evaluation process for procuring equipment. This meant that expert groups were often required to carry out multiple technical evaluations on the same pieces of equipment. A standardised process in Phase II should remove this bottleneck.

Reducing Climate Risk

Climate change data must be further downscaled. Further downscaling of climate change impact modelling to at least district level is required before this data can be fully utilised by CDMP activities (such as the CRA process) and by other stakeholders. In Phase I the CCC helped establish a climate change study centre in BUET to model climate change impacts down to district and eventually to upazila level. Continual support to this centre will be required in Phase II to ensure this can take place.

Coordination between climate change focal points must be improved. The establishment of climate change focal points throughout government departments as a way to broadly mainstream climate change issues met with considerable challenges in Phase I. Communication with and between focal points was often sporadic and those civil servants designated as focal points were frequently rotated into new positions. In Phase II co-ordination between focal points must be prioritised, with the development of a strong communication mechanism. The challenge posed by high turnover rates in government can be alienated somewhat by designating focal points as an established position rather than a set of activities attached to an individual person.

Adaption research projects must continue over a significant period of time to be effective. Regarding the research and study initiatives, a lack of time and funds limited the results that could be obtained from climate change research projects. Climate change research is an area that particularly benefits from longer term projects. Therefore any research projects should be started early on in Phase II and receive sufficient funds to ensure they can continue over a considerable period.

A wide variety of data sources and prediction models must be employed. Limitations in data inputs and the parameters of prediction models mean that a wide variety of data sources and models must be fully assessed and employed to ensure the reliability of results.

Partnerships with research organisations have improved the research process. Institutions with a strong research background including BARI, BRRI, CEGIS, BARC, BUP, ICDDR, BCAS, and NIPSOM have helped ensure the research process for climate change adaptation projects has been a smooth one.

The LACC programme should be expanded. This should include the exploration of additional climate change adaptation options. Following the latest predictions of the Intergovernmental Panel on Climate Change regarding Bangladesh, options suggested by project beneficiaries and other project stakeholders should be reviewed, validated and tested. The programme should also be expanded to a variety of climatic regions, and viewed as an opportunity to build the capacity of the Department of Agricultural Extension in regards to climate change adaptation methodologies.

Adaptation to climate change is a social learning process that creates the capacity to cope with change related impacts. Adaptation to climate change is very location specific – not all options and technologies fit to everywhere and every season. Multiple and integrated adaptation measures across sectors as well as institutional capacity building and organizational networking with clear definitions of roles and responsibilities are essential.

Applying a livelihoods perspective is helpful to understand and promote local level adaptation to climate change a) Agriculture Adaptation to Climate Change in the broad sense; b) Strengthen the linkages with RI in various sectors; c) Monitoring ongoing adaptation practices; d) Alert on risks of mal-adaptation, and e) Transmit the message to policy makers.

Value of indigenous knowledge and practices in the context of managing future risks strengthen a bottom up approach and transmit the local knowledge to the Research Organizations. Farmers' acceptance of the CCA options is also a function of their awareness of Climate Change Impact.

Launch adaptation with a focus on current variability and DRM as an entry point at the community. Linking DRM, Climate change and development is essential in the formulation of long-term adaptation measures/strategies. Re-strengthen research and development link in order to improve/delivery of technologies as well as promoting public-private partnership in climate change adaptation is required.

Emergency Response and Information Management

The DMIC must be able to manage disaster information on a 24/7 basis. In order for the DMIC/DMIN to fully carry out its role District DMIC resource centres will have to be strengthened with DMIN expanded to the remaining 250 Upazilas, and corresponding IT training provided. Operational linkages should be established between Bangladesh Tele-centres Network and DMIC. Cell Broadcasting capability should be supported and operationalized. Steps should be taken to detail out early warning messages for specific locations. Remote areas, like the distant islands, which are not yet covered by the usual communication network, need to be better serviced.

Disaster Management legislation should be further improved on the issue of local level early warning. The present Standing Order on Disaster should be further refined with respect to community level early warning issues; particularly for the role assignment and accountability of the institutions at community level and specifically to hazards needs to be clearly mentioned. It would allow the agencies to have a clear mandate regarding what to do for local level early warning. Hazard specific Standard Operating Procedures following the Standing Order on Disaster and other hazard specific standards should be developed for further rapid operation of the DMIC and DMIN at national level as well as for agencies at the ground level.

Increased coordination between separate volunteer groups. Various NGOs, projects and programmes have their own volunteers and are often working on similar kinds of early warning activities. A well-coordinated approach through an overseeing role of Union and Upazila DMCs is recommendable. Union DMCs should also be activated further in early warning dissemination.

Localised warning systems need to be further developed to ensure they are relevant to each specific community, improving the likelihood that they will be heeded. Capacity building and enhancement of 'hazard-livelihoods-geography specific' early warning system needs should be developed further, and more localized products should be developed. In this context 'Local reference systems' for flood with respect to the nearest flood forecast point of the Flood Forecasting and Warning Centre should be followed. Flood forecasting covering the entire major river-system of the country needs to be strengthened, to at least meet the standards established by cyclone early

Improvement and expansion of Cyclone Preparedness Programme. It was Phase I it was found that the capacity and functionality of the CPP need to be enhanced further to have a fully effective cyclone early warning system down to household level. In this respect, manpower, logistics, regular training and resource mobilization are crucial. There is a big need for expansion of cyclone early warning information through expansion of the radio networks and cell broadcast network in the sea areas (e.g. up to Exclusive Economic Zone in the Bay of Bengal) for fisherman and to respond to the cyclone warnings in time.

Expansion of warning systems for riverbank erosion should be pursued. For riverbank erosion, the present system of prediction in the Jamuna has shown good results. This system needs to be made available in time each year to local office of Bangladesh Water Development Board, local administration, local NGOs and concerned communities.

An ongoing IT maintenance policy is needed from the Government to ensure sustainability of the DMIN and the Portal. GoB should approve a maintenance policy for the IT equipment to ensure the sustainability of its information network. GoB needs to allocate budget resources to meet the cost of DMIN portal too. Some activities can be included to train non-transferable GoB officers in programming and content management system.

The DMIN Portal must be fully implemented and user functionality improved. Although the DMIN Portal is functioning, its feature set is currently somewhat limited. Improvements in user functionality are also sorely needed as many users of the Portal only have rudimentary IT skills. One way to potentially go about this includes linking GIS data with other sections of the site (for example, accessing location based documents through a GIS interface). There is also still work to be done in establishing a standardised format for incoming reports and documents provided to the portal by stakeholders. A common system will need to be established to prevent the Portal suffering from information overload.

DMIN warnings need to expand beyond the internet to reach those without access to it. Current forecast and warning subscriptions require access to the internet as well as some computer literacy. At the local level these are often lacking. Therefore it should be investigated whether other sign up methods are possible, such as community or Union sign up sheets or subscription via SMS.

Additional technical partners would improve the quality of information on the DMIN Portal. Piloting the portal with technical partners has been successful, and more technical partners should be sought. This would increase the information available on the Portal and help solidify its place as a central repository of disaster related information.

The rollout of IT equipment should be aligned more closely with the provision of IT training. All Upazilas should be connected with the DMIN. However, for effectiveness purposes, the next phase of CDMP is recommended to procure and distribute the IT equipment for internet connection after having conducted IT capacity building initiatives among the operators. The Government must also be encouraged to promote e-governance initiatives, to encourage PIOs to use the IT equipment for internet access.

Section IV. Way Forward

Many high quality products have been developed and finalised in this last year of CDMP Phase I. The challenge is now to further refine these products and fully mainstream them into the disaster management system of Bangladesh, continuing the paradigm shift from a focus on disaster response to a comprehensive risk management framework. Many activities undertaken can also be upscaled and expanded, and gaps identified in existing programmes can be met with new innovations to existing programmes.

There is enormous potential in the Training and Education Network, CRA process, earthquake and tsunami risk mapping and contingency planning, climate change modelling and adaption research, and the DMIC and its associated services that is yet to be utilised. Although all these products still require revision and improvement, the bulk of the work has been completed. What is required now is the political and organisational drive to integrate these products within the government system so that their use becomes no remarkable event but second nature – a natural part of the system. Overcoming the considerable organisational inertia that is usual in established agencies will be challenging, but must be matter of priority given the potential benefits for all stakeholders.

Professionalising the DM System, Mainstreaming and Capacity Building

Support in the area of professionalizing of the disaster management system should be continued. More focused support should be provided to further develop the capacity of the concerned Ministry and its relevant attached offices to build their capacities in developing and updating policies and legislations on disaster management.

Education and training programmes especially for officials working in agencies related with disaster management should be continued. This will help in creating a resource pool within these organizations and thereby help the process of professionalizing the disaster management system in the country.

Advocacy with the Government should be made to retain the trained manpower with the concerned institutions for the sustainability of the capacity thus built because project initiative. Here it may be mentioned officials of the Government belonging to the cadres of the civil service are frequently transferred from one ministry or agency to the other.

Partnership development

In the wake of the climate change, more partnership especially international should be forged with institutions and organizations around the world to share and disseminate emerging knowledge and information on different dimensions of disaster and their management.

Demand and supply in disaster management with respect to human resources needs to be determined first. Otherwise, institutions producing educated and trained personnel will remain unutilized meaning waste of resources and human resources. That CDMP has been instrumental in the setting up of academic programmes in Disaster Management at the tertiary level in several

institutions, public and private, is commendable. However, more emphasis should be given in investigating the job market potential of students graduating from such programmes of study.

In the area of research, multi disciplinary research initiatives should be promoted in the Phase II.

In the future more concerted efforts are needed to disseminate the research findings at national level for effective policy formulation and also replication in the field. This will help in effectively coping up with disasters of varied type and nature. Moreover, global linkage and network should also be developed for wider sharing the research finding. For this purpose publication of a research journal may be considered in the future.

Media needs to be used more intensively than before. The earlier left out radio media should be extensively utilized in the future for disseminating information and building awareness on disaster management at the mass level. Other print and electronic media should also be used for the purpose through a well developed action plan developed on the basis of experience and lessons learned through the implementation of the Phase I.

Networking with the Ministry of Information by entering into an agreement by signing a MoU should be actively considered for prompt and speedy dissemination of message and information on disaster in a sustained manner.

Community Empowerment

The CRA guidebook needs to be revised and up dated to make it more inclusive and address the issues of children and socially disadvantaged population in CRA & RRAP process.

More concerted efforts should be taken to further sensitize the GOB counterpart towards Disaster Risk Reduction.

The duration of LDRRF projects should be at least three years to ensure assessment of project impacts and sustainability

In the implementation preference should be given to local NGOs in the NGO selection process. As the local NGOs have local knowledge and network that are essential for the successful implementation of the projects.

In the future more provision should be there for imparting training to the partner NGO team members. This is because they are the front line officials responsible for implementation of project initiatives in the field. As such, they need to be equipped with required knowledge and skills.

To ensure cooperation of both government and agencies, coordination meetings at district level should also be extended up to Upazila level. This will be effective to bring GoB officials on board in producing desired result.

Earthquake and Tsunami Preparedness

The project should make pro active more to convince the Geological Survey of Bangladesh (GSB) to prepare and update geological map for the country as a priority since quality assessment of land is the pre-condition for proper land-use planning for the cities vulnerable for seismic hazard.

The project should take initiative to discuss the issue of Earthquake Hazard Risk with RAJUK as it has almost finalized the Detailed Area Plan (DAP) for the Dhaka City and it did not consider the Earthquake Hazard Risk Map that needs to be incorporated. In this regard, the Comprehensive Disaster Management Programme (CDMP) would provide the earthquake micro-zonal map to RAJUK and other utility and lifeline agencies.

The project in the future should take immediate steps to prepare risk and hazard maps for other earthquake vulnerable cities of the country. Once these mapping is completed detailed physical plans for those cities should be prepared taking account of such maps for effectively control of physical development in those cities.

In the second phase, the project should advocate for the establishment of the proposed Bangladesh Seismic Commission to play the lead role in conducting seismic hazard risk assessment.

Climate Change

The current challenge with climate change is to take the separate piece meal efforts of separate organisations and channel them into a comprehensive climate change strategy. Carrying out this activity will be no mean feat but a way forward could be the development of a climate change mainstreaming guideline as a way of securing broad based agreement on the overall direction a strategy could take.

Tools that are currently being used for assessment need to be updated and upgraded.

Impacts of flooding need to be assessed for the country as a whole to capture different scenarios.

Impact of climate change on storm surge inundation in the coastal area needs to be assessed in the future.

Regional climate models should be utilized in generating climate change scenarios.

More research initiatives are needed on integrated adaptation planning.

The economic models should be up dated with recent available data and information.

The institutional model developed in CCA and list of options tested in the LACC I & II has a enormous potential to test and promote in other and similar areas

Emergency Preparedness and Information Management

In the plan to improve the overall effectiveness and efficiency of disaster preparedness in Bangladesh, the DMIN Portal is slated to be the key node that links operational disaster management activities taking place in districts with strategic decision making bodies at the national level. Before this can occur though the Portal's user interface must be significantly improved so as

to be intuitive to all stakeholders. Numerous trials with the system will also be required to ensure it efficiently manages the enormous influx of data a large disaster event will inevitably trigger.

Funding provision for maintenance should be increased in the future.

ICT training and awareness raising programmes should be increased.

To overcome language barrier Bangla Interface should be developed in the future.

Effective mechanism is to be developed to ensure communication after office hour

- Community Resource Center needs to be established for wider information access
- Strengthening of early warning dissemination through cell broadcasting required for mass people early warning
- Expansion of DMIC to rest of the Upazilas
- Automated Weather Station for BMD – Field Server, Mobile /Internet infrastructure.
- FFWC capacity building – automated real time data acquisition
- Disaster Management decision support system for evacuation and early response planning / management – Shelter/ Road-River network/ Settlement database, shortest path algorithm, Route planning
- CPP volunteer database and capacity building
- Establishment of real time earthquake observatory station

Attachment 3: List of publications by CCC (Comp 4b, CDMP)

Study Reports

- Characterizing Country Settings: Development of a Base Document in the Backdrop of Climate Change Impacts
- Characterizing long-term changes of Bangladesh climate in context of agriculture and irrigation

Research Reports

- Climate Change, Gender and Vulnerable Groups in Bangladesh
- Adaptive Crop Agriculture Including Innovative Farming Practices in the Haor Basin
- Crop Insurance as a Risk Management Strategy in Bangladesh
- Climate Change and Health Impacts in Bangladesh
- Adaptive Crop Agriculture Including Innovative Farming Practices in the Coastal zone
- Climate Change and its Impact on Transmission Dynamics of Cholera

Modeling Reports

- Economic Modeling on Climate Change Adaptation Needs for Infrastructure in Bangladesh
- Environmental Cost of the Climate Change
- Generation of PRECIS scenarios for Bangladesh (Validation and Parameterization)
- Impact Assessment of Climate Change and Sea Level Rise on Monsoon Flooding

Training reports

- Workshop on Climate Change Impact Modeling: Report and Presentations
- Climate Change and Bangladesh: Report on the Training of Government Officers

Other Documents

- Climate Resilient Development: Country Framework to Mainstream Climate Risk Management and Adaptation
- Climate Change Impact Modeling: Institutional Road Map
- Climate Change and Bangladesh: Annotated Bibliography
- Climate Change Impacts and Vulnerability: A Synthesis
- Climate Change and Bangladesh

Awareness Materials

- Booklets (Bangla & English)
 - Climate Change and the Vulnerability of Bangladesh
 - Climate Change Risk Management at Local Level
 - Role of Local Government to Address Climate Change Issues
 - Role of Government Officials to Climate Change Risk Management
 - Climate change and water
 - Climate change and agriculture
 - Climate change and rice
 - Climate change and fisheries
 - Climate change and wetlands
 - Climate change and mangrove
 - Climate Change and Bangladesh: Our Responsibilities (Only in Bangla)
 - Climate Change and Bangladesh: Risk Reduction and Adaptation Practices (Only in Bangla)

- Climate Change and Bangladesh: Stories of Risk Reduction & Adaptation among Vulnerable Communities (Only in Bangla)
- Fact Sheet (Bangla & English)
 - Physiography of Bangladesh
 - Classification of lands in Bangladesh
 - Agro-ecological region of Bangladesh
 - Floods in Bangladesh
 - Drought in Bangladesh
 - Impact of global warming and climate change
 - Climate risks and vulnerable sectors
 - Climate change and sea level rise
 - Climate change and water
 - Climate change and public health
 - Climate change and agriculture
 - Climate change and women
 - Climate change and children
 - Climate change and food security
 - Climate change and poor
 - Climate change and development
 - Climate risk assessment and action plan development
- Comic Books (Only in Bangla)
 - Changing climate, are we prepared?
 - Climate Change and Bangladesh – An Awareness Journey
- Board Games:
 - Changing Climate – Global Challenge
 - Changing Climate - Vulnerable Bangladesh

Bulletins

- Issue I (October – December 2005)
- Issue II (January – March 2006)
- Issue III (July 2006)
- Issue IV (July 2007)
- Issue V: Road to Bali Issue (December 2007)
- World Health Day Special Issue: Protecting Health from Climate Change (April 2008)

Briefing Papers

- Changing the Way We Develop: Dealing with Disasters and Climate Change in Bangladesh (Special Communication for the Oslo Policy Forum, 28-29 February 2008)
- From Vulnerability to Resilience: Bangladesh Preparing for Climate Resilient Development (Communication Brief)
- Bangladesh: Reducing Development Risks in a Changing Climate (Briefing paper for BD-UK Climate Change Conference held on 25 March 2008)

Fact Sheets

- Climate Variability and Change in Bangladesh: Impacts, Vulnerability and Risks (English)

- Jolobayu Poriborton: Biponno Bangladesh (Bangla)