Comprehensive Disaster Management Programme (Component 5b)

Contract agreement no. BGD/01/004-CDMP/EC/5b/PC-1

Support for a Disaster Management Information Network (DMIN)

Report on Communication Mapping and Planning at Community Levels

July, 2009
Bangkok, Thailand

Submitted to:
Comprehensive Disaster Management Programme (CDMP), Dhaka, Bangladesh

Asian Disaster Preparedness Center

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Acronyms

ADPC	Asian Disaster Preparedness Center
AFD	Armed Forces Division
AVD	Ansar and Village Defence
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BARL	Bangladesh Amateur Radio League
BB	Bangladesh Betar
BCAS	Bangladesh Centre for Advanced Studies
BDPC	Bangladesh Disaster Preparedness Centre
BDRC	Bangladesh Red Crescent Society
BMD	Bangladesh Meteorological Department
BMDA	Barendra Multipurpose Development Authority
BP	Bangladesh Police
BRRI	Bangladesh Rice Research Institute
BTTB	Bangladesh Telegraph and Telephone Board
BTV	Bangladesh Television
BWDB	Bangladesh Water Development Board
CDMP	Comprehensive Disaster Management Programme
CEGIS	Center for Environmental and Geographic Information Services
CFAB	Climate Forecast Applications in Bangladesh
CFGD	Community Focus Group Discussions
CFIS	Community Flood Information Systems
CLIFMA	Community Level Information Flow Mapping Assessment
CPP	Cyclone Preparedness Programme
CRA	Community Risk Assessment
CRED	Centre for Research on the Epidemiology of Disasters
DAE	Department of Agriculture Extension
DC	Deputy Commissioners
DER	Disaster Emergency Response (Group)
DfID	Department for International Development
DGF	Directorate General of Food
DMB	Disaster Management Bureau
DMC	Disaster Management Committees
DMIC	Disaster Management Information Centre
DMIN	Disaster Management Information Network
DoS	Department of shipping
DRM	Disaster Risk Management
DRR	Directorate of Relief and Rehabilitation (internationally used)
DRR	Directorate of Relief and Rehabilitation
DRRO	District Relief and Rehabilitation Officer
EC	European Commission
EU	European Union
ECMWF	European Center for Medium range Weather Forecasting
EMIN	Environmental Monitoring and Information Network
EOC	Emergency Operation Centre
EW	Early Warning
EWS	Early Warning System

FFWC	Flood Forecasting and Warning Centre
FSCD	Fire Service and Civil Defence
GOs	Government Organizations
GoB	Government of Bangladesh
GTS	Global Telecommunication System
HF	High Frequency
ICT	Information and Communication Technology
IFGD	Institutional Focus Group Discussion
IGA	Information Generation Agencies
IMD	India Meteorological Department
IMDMCC	Inter Ministerial Disaster Management Coordination Committee
IWM	Institute of Water Modeling
JMA	Japan Meteorological Agency
JMREMP	Jamuna-Meghna River Erosion Mitigation Project
JTWC	Joint Typhoon Warning Center
LDRRF	Local Disaster Risk Reduction Fund (under CDMP)
MFI	Micro Finance Institutions
MoFDM	Ministry of Food and Disaster Management
MoU	Memorandum of Understanding
MoWR	Ministry of Water Resources
NGO	Non Government Organization
NOAA	National Oceanographic and Atmospheric Administration
PIO	Project Implementation Officer
PM	Project Manager
PPPDU	Policy Programme and Partnership Development Unit
PTWC	Pacific Tsunami Warning Center
RIMES	Regional Multi-Hazard Early Warning System (ADPC facilitated)
SMRC	SAARC Meteorological Research Centre
SMS	Short Messaging Service
SOD	Standing Orders on Disaster
SODM	Standing Order on Disaster Management
SPARRSO	Space Research and Remote Sensing Organization
SRDI	Soil Research and Development Institute
SWC	Storm Warning Center
TOR	Terms of Reference
TSR	Tropical Storm Risk (a venture of UK on tropical cyclone prediction)
UEWIC	Union Early Warning Information Centre
UNDP	United Nations Development Programme
UNO	Upazila Nirbahi Officer
UNOPS	United Nations Office for Project Services
UP	Union Parishad
UDMC	Union Disaster Management Committee
UDMIC	union Disaster Management Information Centre
USAID	United States Agency for International Development
UzDMIC	Upazila Disaster Management Information Centre
UzDMC	Upazila Disaster Management Committee
VHF	Very High Frequency

Study Team

AR Subbiah (Team Leader, Early Warning Systems)
Atiq Kainan Ahmed (Social Scientist and Project Manager)
Moloy Chaki (Senior National Consultant)
Mozaharul Alam (Risk Management Specialist)
S.H.M. Fakhruddin (Technical Specialist)
S.M. Alauddin (Sociologist)
Md. Abu Syed (Technical Coordinator)
Md. Shamsul Alam (Research Officer)
Rabi Uzzaman (Research Officer)
Afroza Taznin, (Research Officer)
Golam Maainuddin (Research Officer)
Md. Aminur Rahman (Research Officer)

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Executive Summary

The present report titled "Report on Communication Mapping and Planning at Community Levels" is comprised of three important segments of information on community level multi-hazard early warning system in Bangladesh. The results of Community Level Information Flow Mapping Assessment (also called CLIFMA in short); suggested design for proposed Disaster Management Information Network (DMIN); and the piloting plan for field testing of proposed DMIN design in a ground situation are discussed in this report. This document contains findings and recommendations from different levels including household, community, local institutions and technical grounds and forwarded technical recommendations for pilot field testing of the DMIN design down from upazila to household level.

The present document is the final revised version of "Report on Communication Mapping and Planning at Community Levels". The comments received from CDMP on the earlier draft are now substantially addressed and incorporated in the report.

Overall methodology of the report

The report gradually developed through a systematic five-step methodological flow. The first step was on secondary review where the existing initiatives are tapped into. In step two, the designing of the CLIFMA field assessment was shaped up and led into the third step where the actual field work was carried out. In this third step, the field assessment was carried out in various layers including household, community and local institutions. On the basis of the field findings and collected recommendations, the designs for DMIN were developed. In fourth step, two different designs were developed analytically for field testing. After developing the two proposed designs, a proposed piloting methodology and plans for field testing are outlined as the final step. This is expected that these designs will be pilot tested in various real settings and practical recommendations will be forwarded for final operation and will act as an operational network to share information from national down to household level for effective early warning responses in the community.

The CLIFMA field study

The CLIFMA field study was carried out using both quantitative and qualitative action research techniques. Quantitative household survey, community level qualitative focus group discussions and agency level discussions were employed to capture in-depth multi-level information on the multi-hazard early warning information flow. The current status of local level early warning in various hazard prone areas, existing practices, perceptions and preferences on various early warning issues are captured in a systematic way. Perspectives of the early warning "end users" (i.e. people of households and communities) and "practitioners" (i.e. facilitating professionals and institutional representatives) are recorded side by side in CLIFMA study. CLIFMA household survey was conducted among eight hundred sample households in twenty five vulnerable communities from twenty districts focusing seven most frequent hazards in the country. The hazards included are cyclone/storm surge, riverine flood, flash flood, river bank erosion, tsunami and landslide. The community level focus group discussions were carried out using participatory techniques to collect primary qualitative information from the communities at stake. Fifteen institutional level focus group discussions were also carried out in from fourteen districts.

Secondary review of existing community level EW initiatives/projects

Besides the field study, a secondary review was carried out to explore the most recent initiatives of community based early warning in the country. Through active discussions with various agencies and institutions working in early warning field, it was found that there are some key projects and initiatives existed relating to community based early warning systems in various locations. Reviewing these initiatives or projects was essential in two senses. Firstly, in

order to avoid duplications of work it was essential to look at what other initiatives are doing at community level. It was found that most of the projects or initiatives are primarily related to either improvement or enhancement of the early warning dissemination and capacity building of local level early warning system. Most of the initiatives also worked on early warning package development suitable for the communities or for building further capacity to link target communities with the national system on an ad hoc basis. It was important to know what these project or initiatives are recommending.

Secondly, the review was quite important in a sense that lessons of existing projects at community level would result in recommendations for our purpose which is developing a DMIN design and testing. The secondary review successfully yielded useful results in this line. It has given good exposure to those initiatives which are useful to know before attempting to design DMIN. Under the review initiatives such as CFIS/CFAB for riverine flood, CPP and KU initiatives for cyclone, BUET study on cyclone and tsunami, BWDB-CEGIS-JMREMP initiative on riverbank erosion are prominent among others. Follow-up to the secondary reviews, field sites of some of these projects were also visited by the ADPC team and gathered in-depth practical information useful for further design improvement. Beside the CLIFMA field study findings these lessons from the existing works are also put as design input for proposed DMIN.

DMIN Design

Finally taking three tiers of field study recommendations (household level, community level and institutional level), capturing lessons from the existing projects/initiatives, and based on the discussions with the on-going project professionals/representatives from various agencies, the ADPC DMIN support project early warning technical team have come up with two proposed designs for field testing and establishment of future DMIN.

The first design proposed is primarily for the rapid onset and rapid seasonal onset hazards. This design has the regular time hazard warning and information sharing mode as well as the emergency voluntary mode. During the rapid onset hazards the mode shifts into an emergency voluntary mode and initiates a “parallel process” of early warning notification besides the regular form of administrative methods of early warning and notification. As per this newly proposed DMIN design (Design-1) DMIC (as well as other early warning source agencies) will send the early warning to the community based “Union Early Warning Information Centers” (UEWIC) as a parallel system along with the regular system of sending the early warning to the district level. One of the major recommendations came from the CLIFMA study and the project experiences that a “parallel system” of transmitting early warning directly to the union level should be established. This was also recommended due to multiple reasons including bring rapidity for information flow, reduction of information lag-time and bring the communication closer to the community-institution people put faith into. The proposed design-1 is accommodative to this provision.

The second proposed design of DMIN is primarily for the slow and slow seasonal onset hazards. This is also a design for regular hazard-wise advisory and early warning information sharing. This network follows primarily the sectoral line incorporating the DMIC. For example, this design would be useful for any slow onset drought or slow growing hazards. Following the regular time progression, the disaster and hazard related information and actions can be taken continuously through this network. Primarily, the disaster management information system would be mainstreamed into the overall agency and sectoral networks where the hazard specific developments and situations can be continually addressed with a regular frequency. This second form of design will also complement the DMIC with a regular information sharing mechanism with the community and respective agencies and will remain in touch all the time on regular happenings. This “regularly in touch” habit would allow DMIC to become more usefully networked with the other departmental and sectoral networks and operate in a complementary way. This would be a value added system and crucial element for sustainability of the DMIC in future.

Pilot testing plan

On the basis of the proposed design, the present report comes up with a concrete piloting methodology for testing the design in an operational setting. The piloting plan proposes to take up three hazards for piloting. These are: riverine flood, cyclone/storm surge and river bank erosion. The major objectives of the three hazard-wise piloting exercises are to test the proposed DMIN design, observe how it functions in a real or simulated situation and come up with recommendation for establishing the DMIN design that can function operationally along with the DMIC in future. The proposed field tested DMIN network is expected to bring functionality of the early warning information flow more effectively and sustainably down from upazila to household level.

Chapter 1. Introduction

1.1 Background

The Comprehensive Disaster Management Programme (CDMP) adopts a strategic institutional and programming approach to mitigate long-term risks and to strengthen the operational capacities of relevant institutions for responding to emergencies and disaster situations including actions to improve recovery from these events. Through the initiatives taken in the past, the Government of Bangladesh, Ministry of Food and Disaster Management (MoFDM), Disaster Management Bureau (DMB) and other relevant stakeholders have demonstrated significant commitment towards implementing a comprehensive disaster management strategy. The overall CDMP components are outlined in the following table (Table 1-1):

Table 1-1. CDMP Component Structure.

Strategic Focus	Corresponding Components
1. Professionalising the disaster management system	**1a** Policy, Program and Partnership Development Unit (PPPDU) **1b** Professional Development
2. Mainstreaming of risk management programming (partnership development)	**2a** Advocacy and Awareness **2b** Capacity Building
3. Strengthening of community institutional mechanisms (community empowerment)	**3a** Program Gap Analysis **3b** Risk Reduction Planning **3c** Local Disaster Risk Reduction Fund **3d** Support for Livelihood Security – Hazard Awareness
4. Expanding risk reduction programming across a broader range of hazards	**4a** Earthquake and Tsunami Preparedness **4b** Climate Change and Research
5. Strengthening emergency response systems (operationalising response)	**5a** Disaster Management Information Centre **5b** Support for a Disaster Management Information Network
6. Food security	

Source: CDMP

Under Component 5b, CDMP aims to develop and establish an appropriate disaster risk management mechanism in Bangladesh through appropriate institutional arrangements. Establishment of a Disaster Management Information Network (DMIN), which is the main purpose of the present project, is one of the major components of the overall disaster management strategy. The European Commission (EC) component is providing major support towards the development of the DMIN for CDMP and MoFDM.

In this line, the Asian Disaster Preparedness Center (ADPC) based in Thailand has signed a Memorandum of Understanding (MoU) with CDMP and other Bangladeshi disaster management related agencies in order to provide technical assistance to establish and enhance technical support towards this comprehensive strategy development for the country. In December 2007, ADPC has entered into a new contract agreement with CDMP to provide professional support to CDMP. The present "Report on Communication Mapping and Planning at Community Levels" is a major study report and step of this ongoing support to CDMP in the form of project titled "Design, Test and Demonstrate a DMIN Down to Household Level" (contract agreement number BGD/01/004-CDMP/EC/5b/PC-1).

1.2 Project goal and objectives

The Comprehensive Disaster Management Program (CDMP) under the Ministry of Food and Disaster Management (MoFDM) has set the overall ***goal*** of the Disaster Management Information Center (including this ADPC assisted current support project) as below:

> *"...to implement an effective information sharing system to be operational among the disaster management agencies and communities for all hazards and in all sectors in all normal and emergency times throughout the nation and regionally to support sustainable risk reduction and emergency response capacity".*

Under Component 5b, Support for a Disaster Management Information Network (DMIN), the following key ***objectives*** are outlined: a) disaster management network is operational and demonstrated down to the household level; b) hazard message "links" are effective (both ways between data sources and households) through an integrated information dissemination and coordination system; and c) disaster preparedness messages are successfully transmitted through one fully integrated hazard risk communication network. In this line, the following scopes and objectives set the context of the present report.

1.3 Scope and objectives of the report

1.3.1 Scope

Support for a Disaster Management Information Network (DMIN), Component 5b of the Comprehensive Disaster Management Programme (CDMP), has been committed to establish an effective disaster risk management mechanism in Bangladesh. The Asian Disaster Preparedness Center (ADPC) under this component is providing technical support to "Design, Test and Demonstrate a DMIN down to Household Level". As per the revised work-plan and CDMP approved "Supplementary note to inception report" (October, 2008) the Community Level Information Flow Mapping Assessment (CLIFMA) was planned and envisioned as the primary input to the designing of the DMIN down to the household level.

The present report with the proposed DMIN design and concrete piloting plan aims to contribute to the next phase of the project which is to take up several pilot testing for three hazards in selected locations as per the piloting plan discussed in the last chapter. These piloting experiences will contribute towards recommendations for DMIN finalization down upazila and upto household level. The overall framework of the present report is outlined in Chapter 2, Section 2.1.

1.3.2 Objectives of the CLIFMA

The major objectives of the Community Level Information Flow and Mapping Assessment (CLIFMA) and this associated "Report on Communication Mapping and Planning at Community Levels" are developed to investigate the following issues that would provide empirical substances and people centric responses for the designing of DMIN down to the household level:

- Existing community and local level responses on the early warning information flow;
- Community and local level responses on the early warning information preferences that would be essential for fostering a nationwide downstream setup for people centric early warning dissemination and risk reduction;
- Identify the gaps of the existing systems and make recommendations for strengthening; and

- Identify people centric solutions and sustainability issues for developing a people centric DMIN that would reach down to the household level of various hazard prone areas of the country.

The findings have been directly used for designing a sustainable DMIN that would function as the national level early warning information network to facilitate the process from upazila (sub-district) down to the household level.

1.4 Outline of the report

The present report is structured in seven different Chapters. The chapters are outlined in a sequential manner and with detailed account of the issues covered in respective chapters leading to next chapters.

The first Chapter, the current one, provides an introductory thought about the background of the project, its goals and objectives and so forth. The scopes and objectives of the present report are outlined in this chapter as well.

The second chapter includes the methodology of the CLIFMA report. The overall methodology of the study, the detailed methodology with description of the quantitative and qualitative methods used, indicators looked at, sampling procedures and the data analysis issues are discussed in this chapter. The reader receives a detailed sequential account of the methodological tools used for the CLIFMA study from this chapter.

The third Chapter, provides a review of the existing community based early warning initiatives carried out over time in Bangladesh. The lead community based early warning initiatives with its pertinent features are reported synoptically in this chapter. Early warning initiatives such as CPP, CFIS/CFAB facilitated flood EW information network, CEGIS-BDPC-LDRRF/CDMP initiative on Multi-hazard Early Warning Dissemination System, Flash Flood EWS initiative by CDMP-CNRS, ActionAid's flood warning system, BUET facilitated study in Cox's Bazar, EW initiatives of ADO-KU in Satkhira, BWDB's JMREMP initiative on riverbank erosion are among others.

The CLIFMA field findings are gradually presented in two chapters. In Chapter four, the household level findings and community level findings are presented in details. Findings and of household survey and community FGDs are presented by hazard here. This chapter provides wealth of information relating to the household perceptions of early warning accessibility, its reliance, people's level of understanding, lead-time, mode of dissemination and various other useful issues that are pertinent for designing the DMIN and its piloting.

The next Chapter (Chapter five), which is the second half of the CLIFMA findings, reports the institutional analysis and findings. The existing EW institutional linkages and gaps (particularly down to upazila), the local institutional level findings form seven hazard specific study areas are reported in this Chapter.

The Chapter six, is a very important chapter of the report and builds on the findings and analysis of the earlier five chapters. The Various layers of recommendations that emerged from the CLIFMA field study are reported in a compiled manner. On the basis of these recommendations comparative synergies for designing the two designs for DMIN down to upazila level is reported in this Chapter.

The final Chapter (Chapter seven), provides the pilot testing plan and detailed activities for piloting and testing the design in an operational setting. The piloting plan proposes to take up three hazards for piloting and ground testing.

Chapter 2. Methodology

2.1 Overall methodology

Follow up to the "Disaster Management Information Link Report" (ADPC, Oct., 2008), the present report provides an in-depth status of the early warning information flow and people's perspectives from multiple spheres such as household, community and institutions. In this line, the "Community Level Information Flow Mapping Assessment (CLIFMA)" has been carried out empirically with the end users and facilitators of the early warning information and products at down to community level. The overall methodology of the CLIFMA has grown systematically in following manner.

Step-1. Secondary Review

A well devised secondary review of existing community level initiatives/projects was undertaken to start up the CLIFMA. In this review, the earlier publication of the current report i.e. Disaster Management Link Report, various project reports, and the agency visit and discussion outputs have contributed systematically. Various prominent community based early warning initiatives with its pertinent features are looked at. Early warning initiatives such as CPP, CFIS/CFAB facilitated flood EW information network, CEGIS-BDPC-LDRRF/CDMP initiative on Multi-hazard Early Warning Dissemination System, Flash Flood EWS initiative by CDMP-CNRS, ActionAid's flood warning related project, BUET facilitated study in Cox's Bazar, EW initiatives of ADO-KU in Satkhira, BWDB's JMREMP initiative on riverbank erosion are among others.

Step-2. Designing CLIFMA field instruments

From the understanding of the existing work and projects, the CLIFMA field study was designed. The household survey questionnaire, and the community and institutional FGDs questionnaires were also developed in this phase keeping in mind about the information gap from the existing projects and initiatives.

Step-3. CLIFMA Field Assessment

Follow up to the field instrument development, interview based surveys in 800 households, and community FGDs in 25 communities and over 14 institutional level FGDs were carried out. On top of that several LDRRF sites and other few sites were also visited and people were consulted. Analysis and systematic interpretation and compilation of the collected information/data was been carried out during this phase as well. Parallel to this, a round of discussions with community based EW project and agency representatives were also carried out on key designing issues of DMIN.

Step-4. DMIN design development

All the inputs (recommendations and findings) from these earlier layers have contributed as input for designing the DMIN down to the household level. They also helped to develop design criteria on which the design has been given major concentration. Two designs: a) one for rapid and seasonal onslaught (emergency type); and b) another one for regular time (slow onset hazard), has derived in this stage. Two proposed DMIN designs have been put forward for the piloting exercise.

Step-5. Development of a Pilot testing methodology

These designs proposed for DMIN are supplemented with a constructive methodology for pilot testing. The major methodological approach, activities and areas are suggested for prospective piloting. The experiences, recommendations and lessons from the existing encouraging initiatives are again drawn to situate final recommendation for the pilot testing.

2.2 Detailed methodology

2.2.1 Methodological tools used

The CLIFMA study brought together information from people's own perspectives to localise the relevant early warning preferences and usability for an effective community based disaster management information network (DMIN) that can be piloted in association with the developed Disaster Management Information Center (DMIC) and other existing national early warning centers, control rooms in an integrated functional platform. Primarily, in CLIFMA study, stakeholders were engaged in following manner:

- People are interviewed from sample households through household surveys;
- People are consulted in groups at the community level through community FGDs); and
- Upazila and union level institutional representatives are consulted through institutional FGDs.

For **Household Survey,** a quantitative questionnaire was designed and administered during an interview with one household representative (preferably household head) at a time to gather general information about the household's perceptions, practices, problems and preferences relating to various spheres of early warning. The survey questionnaire was translated into Bangla for administration in the field through household survey enumerators under supervision and quality controls of the field researchers.

Community Level Focus Group Discussions (CFGD) were carried out using participatory approaches to collect primary data at the community level. In these community level FGDs sessions were carried out in a participatory mode through guided checklists. Experienced research officers and field coordinators were deployed to conduct such CFGDs with an average cross section of 8-16 members per focus group discussions in the field.

Institutional Level Focus Group Discussions (IFGD) were carried out to capture the local level institutional preferences and recommendations for designing the disaster management information network from the responsible local level institutional representatives of the selected communities.

The above three methodological instruments were used effectively through the field researchers and enumerators guided by the ADPC technical research team to ensure the quality of the study.

2.2.2 Methodology for Quantitative Investigation

a) Parameters included in the household survey questionnaire

The following parameters are included in the household survey where adequate actions are taken for effective early warning communication and information generation. The consideration of community preferences and hazard specificity were considered in the developing of the questionnaire. To address the "non-responsive type of questions" some specific scaling systems were developed. These allowed informants to provide mandatory responses to major questions. The questionnaire also has a section on the household type where the socio-economic and demographic information were used so that the future dataset on early warning issues from community can be classified further. The major parameters used in the household survey questionnaire are as follows:

- General demographic information (age, occupation, literacy etc.);
- Socio-economic status of the household (income, expenditure, landholding);
- Hazard composition and damage experiences;
- Early warning perceptions (EW reliance, reaction etc);
- Early warning availability (receiving, frequency, lead-time, efficiency);
- Sources of early warning (existing and preferred);
- Early warning lead-time need and preferences;
- Sharing, accuracy, trust and validation of early warning information;
- Early warning dissemination (mode, area coverage, quality, efficiency);
- Early warning information message content quality and understandability;
- Preferred dissemination modes;
- Access to communication systems/equipments;
- Use and usefulness of the indigenous early warning systems;
- Institutional preferences (trusted and effective);
- Early warning response options;
- Early warning gaps and barriers;
- Willingness to pay for early warning information;
- Relative access to early warning information for men, women and others;
- Suggestions to improve early warning information; and
- Suggestions for sustainability.

The household survey questionnaire was prepared in English in order to receive technical input from the non-Bangla speaking technical experts and later translated into Bangla for effective administration in the field. Bangla terms in the questionnaire were also field checked for greater efficiency. The household survey questionnaire both the English and Bangla versions are included in the report as Annex 1 (a and b).

b) Determining a sample size and identification of study areas

In order to target sample households to be studied in the respective hazard communities, a system of downscaling was adopted. A well counted review of secondary literature was carried out to identify major seven hazards that regularly occur in the country. These hazards are: cyclone, riverine flood, riverbank erosion, flash flood, drought, landslide and tsunami. From a review of last 30 years hazard occurrences and its frequent reporting in the literature a set of seven hazards were shortlisted. Multiple discussions were held with experts from to validate this further. From the literature and secondary data, it was observed that mostly around 20 districts from all over the country are frequently prone to these seven hazards. The gradual scale-down targeting process for selection of districts, upazila, community and ultimately 800 households for interviewing are shown in the following diagram (figure 2-1).

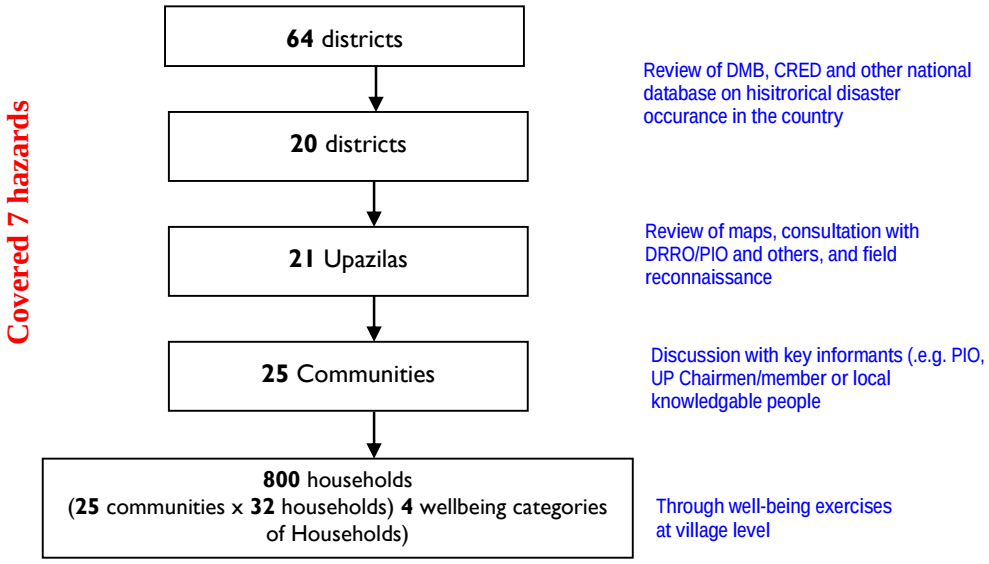


Figure 2-1. Sequential sampling strategy of the households.

The detail selection processes of specific districts, upazilas, communities and households are detailed out in the following sections.

Identification of vulnerable districts:

In order to identify the most prominent affected districts for the seven most commonly occurred hazards (except Tsunami), various sources of historical databases are reviewed. This is to be noted that most of the databases have reported on specific hazard by years and indicated affected districts or the region. A fully established quantitative indexing of 64 districts comparing district-wise ranks of hazards are still absent in the country.

Both the DMB and CRED historical hazard datasets were looked at. It was found that both the datasets provided good information on year and hazard-wise occurrences of the hazard but in area coverage any districts-wises comparison is missing. Besides, these above two databases, other secondary literatures talked about the impacted districts sporadically but did not provide any comprehensive comparative dataset by districts.

Facing this absence of districts-wise database in the country, a matrix was therefore attempted that can give a comparative overview of the districts by hazard. From a careful review of the three sources mentioned above this matrix was developed for targeting the districts. In preparing the matrix and reviewing the three sources: DMB, CRED dataset and literature, the frequency of respective hazard occurrence in the district was indicated through the following classification system.

"+" = The district is occasionally affected,
"++" = The district is regularly affected.
Blank field = The district is not affected,

This exercise yielded a relative indicative matrix of affected districts per hazard and allowed to come up with a batch of most commonly affected districts in the country. Later a set of twenty district was selected for study on the basis of a "purposive strategy" and first five districts for respective hazards are then selected from the batch of districts emerged from the matrix.

The overall results of this district-wise and hazard-wise matrix is reported next page and the list of five most affected districts by hazard are shown further in the Table 2-1 below.

Hazard / District	Cyclone/storm surge	Drought	Riverine flood	Flash flood	Riverbank erosion	Land slide
BAGERHAT	++					
BANDARBAN				+		++
BARGUNA	++		+		+	
BARISAL	++					
BHOLA	++		+		++	
BOGRA			++		++	
BRAHAMANBARIA				+		
CHANDPUR			++		++	
CHITTAGONG	++			+	+	++
CHUADANGA			+			
COMILLA			+			
COX'S BAZAR	++					+
DHAKA			+			
DINAJPUR		+				
FARIDPUR			+		++	
FENI			+		+	
GAIBANDHA			++		++	
GAZIPUR						
GOPALGANJ			+		+	
HABIGANJ			+	++	+	
JAMALPUR			++	++	+	
JESSORE		+	+	+	+	
JHALOKATI	+					
JHENAIDAH			+			
JOYPURHAT		+				
KHAGRACHHARI				+		+
KHULNA	+		+			
KISHOREGANJ			+	+		
KURIGRAM			++		++	
KUSHTIA			+		+	
LAKSHMIPUR	+		+		+	
LALMONIRHAT			+		+	

Hazard / District	Cyclone/storm surge	Drought	Riverine flood	Flash flood	Riverbank erosion	Land slide
MADARIPUR			+			
MAGURA			+			
MANIKGANJ			++		++	
MAULVIBAZAR			+	++		
MEHERPUR			+			
MUNSHIGANJ			+		+	
MYMENSINGH			+			
NAOGAON		++	+			
NARAIL			+			
NARAYANGANJ			+			
NARSINGDI			+			
NATORE		++	+			
NAWABGANJ		++				
NETRAKONA			+	++		
NILPHAMARI			+			
NOAKHALI	+		+		+	
PABNA			++		++	
PANCHAGARH		+				
PATUAKHALI	++		+			
PIROJPUR	+					
RAJBARI			+		+	
RAJSHAHI		++	+		+	
RANGAMATI				+		+
RANGPUR			+		+	
SATKHIRA	+		+	+		
SHARIATPUR						
SHERPUR			+	+		
SIRAJGANJ			++		++	
SUNAMGANJ			+	++	+	
SYLHET			+	++	+	
TANGAIL			++		+	
THAKURGAON		+				

Legend: Blank field = Not affected, "+" = Occasionally affected, "++" = Regularly affected.
Source: Compiled from the review of available CRED database, DMB hazard data and other relevant literature.

Table 2-1. Most frequently affected districts for respective hazards.

Hazards	Most frequently affected districts (most prominent 5) for respective hazards
Cyclone/storm surge	Chittagong, Cox'sbazar, Bhola, Patuakhali, Bagerhat
Flash flood	Sunamganj, Sylhet, Habiganj, Maulvibazar Netrokona
Riverine flood	Sirajganj, Gaibandha, Kurigram, Pabna, Manikganj
Riverbank erosion	Sirajganj, Chandpur, Faridpur, Tangail, Jamalpur
Landslide	Chittagong, Cox'sbazar, Bandarban, Rangamati, Khagrachari
Drought	Naogaon, Chapai Nawabganj, Rajshahi, Natore, Jessore

Selection of upazilas from these districts:

In order to select upazilas from the given districts, multiple materials were used. Different available hazard maps along with the information from reconnaissance field surveys carried out earlier by the ADPC team were re-visited. During the map review, geographical location related issues such as distance from riverbanks, upstream or downstream features, and vulnerability of the people were taken into consideration. An extensive discussion was carried out with the DRRO and PIO and other district level officials to determine the most vulnerable upazilas to the respective hazards.

Identification of communities within the upazila:

Selection of communities for respective hazards from each pre-selected upazilas was done through consultation with local people and union level officials. Discussion with the PIO of selected upazila and discussion with the UP representatives were done. The respective UNO offices were consulted as well to identify the study communities in that upazila. Already exposed villages of respective union were give priority considerations in selection. Community is operationally defined as people living in one geographical area, who are exposed to common hazards due to their location. They may have common experience in responding to hazards and disasters.

Identification of sample households from these communities:

In order to target 800 samples from all type of households within these narrowed down twenty five communities of seven hazards, a well-being exercise was carried out in each community. Whenever the field team went to select households from a given community they have tried to classify the households into four different types of households in consultation with the key informant and local people. Four well-being categories are: a) always deficit; b) occasionally deficit, c) break-even, and d) well-off. Always deficit households are those who have deficits in income and food during most months (or more than 6 months) each year. Occasionally deficit households are those who have deficits in income and food during some months (or seasonally) each year. Break-even households have income and food at a break-even state and does not fall occasionally into a deficit state, but at the same time it is not able to make any major savings; and the Well-off households are relatively well-off, have sufficient savings and hold greater household assets.

Prior to starting the household survey, this wellbeing exercise was carried out in open discussion with the key informants from each respective community. Key informants helped the study researchers to identify household from their communities and classify those in these four well-being categories (as per the operational definitions given above). For example if a number of 32 sample is selected from the community then key informants with their local knowledge on the respective community has helped in identifying equal number of households from each four groups (i.e. 8 household X 4 groups = 32 households). These are carried out in a purposive manner from the experiences of the native key informants and local people so that biasness remain low. Later the selected number of households was narrowed down to include in the household survey and interviewing.

A detailed distribution of selected households is outlined in Table 2-2 (a detailed table by number of male/female interviewees is outlined in Annex Table). It should be noted that the interviews were carried out with both male and female household representatives, but in both cases the information was collected for the overall household and not by the gender differentiated individuals.

Table 2-2. Distribution of the selected households.

Sl. No.	Hazards	Hazard Dominant District and Upazila	Hazard Less Dominant District and Upazila	Recent Hazard Experienced District and Upazila	Community	No. of sample HH
1	Tsunami dominant-cyclone less	Cox's Bazar (Moheshkhali)	Bhola (Char Fashon)	Patuakhali (kalapara)	3	96
2	Cyclone dominant-Tsunami less	Chittagong-Frequent (Anwara)	Satkhira-Less (Shamnagar)	Bagerhat-Recent (Mongla)	3	96
3	Riverine flood	Upper reach: Gaibandha (Fulchari) Kurigram (Ulipur)	Middle reach: Sirajgonj (Kazipur) Bogra (Dhunat)	Lower reach: Pabna (Sadar+Bera+Sujanagar) Manikganj (Shibaloy)	8	256
4	Drought	Naogaon (Shapahar)	Rajshahi (Godagari + Bagha)	Chapai Nawabganj (Nachole)	4	128
5	Flash flood	Sunamganj-Local (Biswambharpur)	Habiganj (Lakhai)		2	64
6	Landslide	Chittagong-Exposed (Hathazari)	Bandarban-High probability (Sadar)		2	64
7	Riverbank Erosion	Chandpur (Sadar)	Sirajganj (Kazipur)	Sylhet (Balaganj)	3	96
					25	**800**

Checking the significance of the sample size:

Beside this above sampling strategy, a quantitative sampling check was also carried out to see whether the total number of the sample households has any statistical significant or not. It was also determined that a number beyond 670 households taken randomly from the affected districts could give a statistically validated robust sample size.

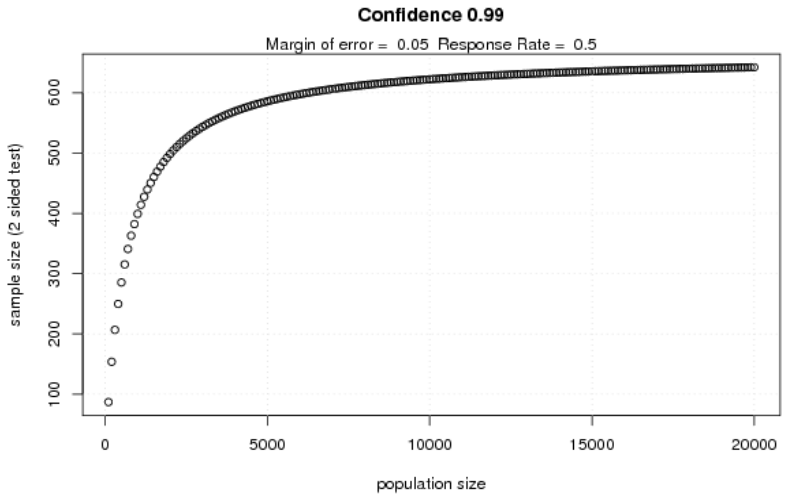


Figure 2-3. A 670 sample size was statistically significant result at a 99% confidence level.

Figure 2-3 suggests that with a confidence level of 99%, a sample size beyond 670 is a large representative sample and covers the two sided test for accommodating design effect. The following diagram shows that the sample size remains robust when it goes over 670 households.

2.2.3 Methodology for qualitative investigation

Besides the quantitative survey, qualitative information was also collected under the CLIFMA field study. Two different types of Focus Group Discussions (FGD)s were designed for the qualitative study. The first type of FGD was at the community level and the other one at the institutional level. For both types of stakeholders, FGD information was compiled and qualitatively analyzed for in-depth insight into the subject matter. In order to get detailed information and maximize participation of the people and stakeholders, the FGD checklists were kept simple. Checklists were developed considering the FGD checklist issues (see the box below) and the necessary modifications were made for the community level and institutional FGDs.

FGD checklist/issues:

- People's access to EW information
- From where/whom they receive EW information (source) and where/who they send to
- Referred local warning dissemination institution/agents
- From whom they prefer to receive early warning information
- How people like to receive warning information (phone, fax, e-mail, telex, radio, TV)
- People's understanding of the early warning information
- Preferred lead-time for respective early warnings
- Feedback mechanism to pass comments/views/recommendations on EW back to national level
- Use of local/traditional knowledge for early warnings
- Adequacy of the early warning institutional structure (structure, function, problems, suggestions)
- Capacity for early warning dissemination (human, technical, financial, etc.)
- Women's role in early warning dissemination
- Perception of vulnerable groups on early warning information access
- Recommendations to improve early warning systems
- Sustainability issues of possible early warning systems/models
- Willingness to pay for sustainability of the early warning systems at the local level

In each on the 25 communities, 1 (one) FGD was carried out with the local people (totalling 25 FGDs) and 15 institutional FGDs were carried out at the upazila level reflecting the various hazard types. The details of the community level and institutional FGD participation and dates are annexed (Annex 2b and Annex 3b respectively).

2.3 Data entry-analysis

Data entry and analysis were done using MS Access software. A database was prepared for data (Figure 2-5). Household data was then analyzed using both MS Access and MS Excel. Dummy tables were prepared and table outputs generated accordingly for reporting. During the data analysis, cross parameter query and cross relationship queries were also generated and descriptive statistical methods were used to make synergic quantitative outputs of the survey data. A hazard-wise data presentation was performed as well for concluding hazard-wise analysis of the household data.

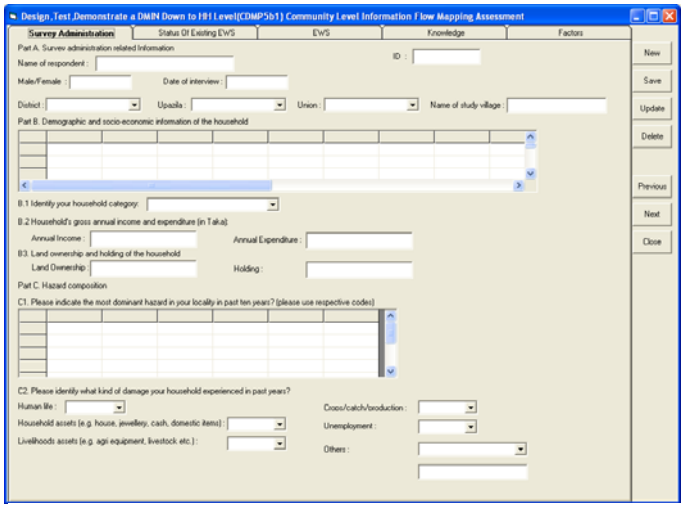


Figure 2-5. Data entry screen for the CLIFMA household survey.

The CLIFMA field study areas are as shown in the map below.

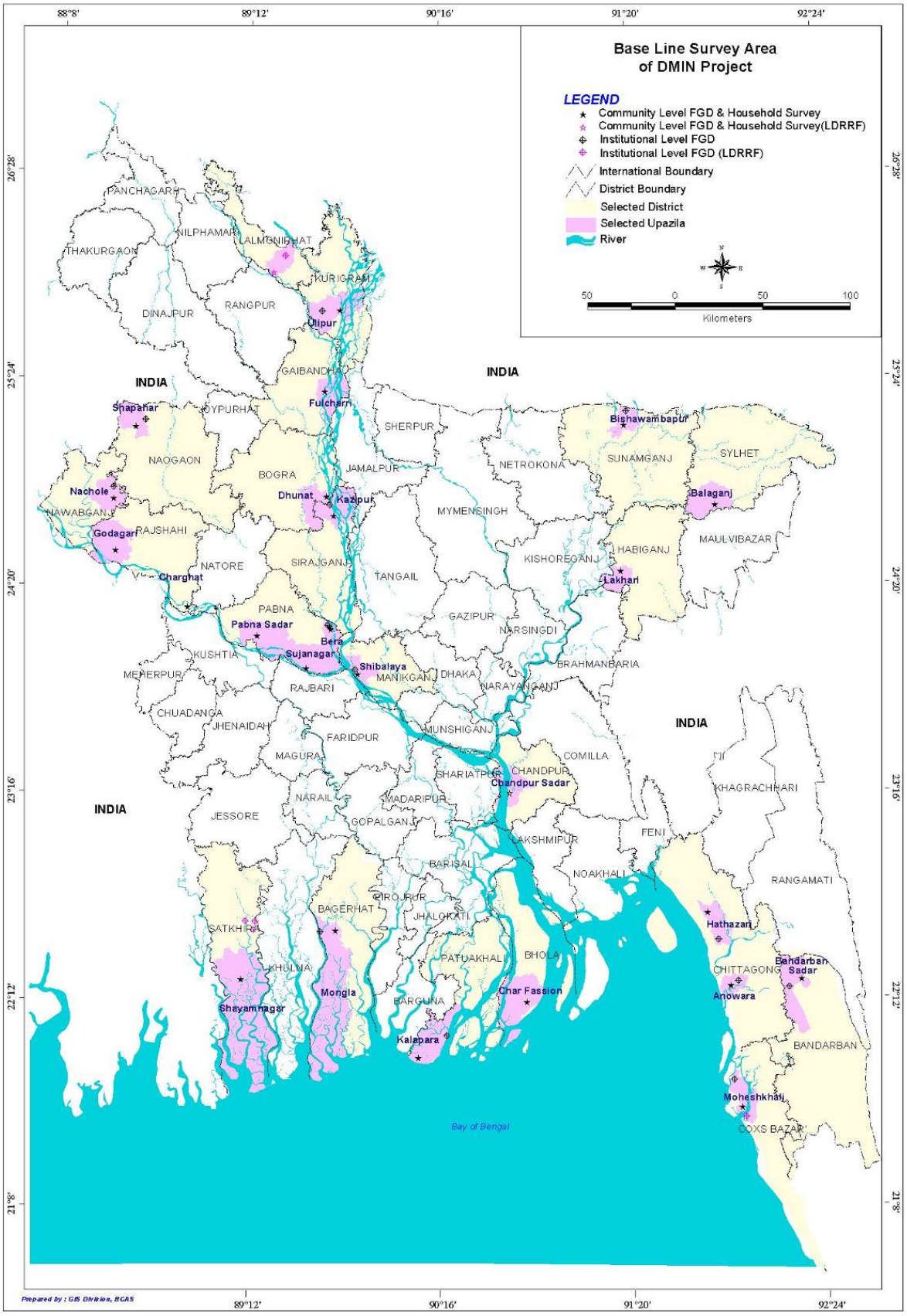


Figure 2-4. CLIFMA field study locations (a total of 25 communities).

Chapter 3. Review of existing community based early warning initiatives

3.1 Review of relevant initiatives

Before entering into the CLIFMA findings and recommendations, an extensive review of the existing community based early warning related initiatives that have been growing over the years in the country were reviewed in this chapter. In reviewing these initiatives existing publications were looked at and respective lead experts or representatives of these initiatives are directly consulted through personal communication and meetings. Discussions held with relevant professionals to tap the key issues and challenges of these initiatives that would help design the DMIN effectively as a national umbrella initiative.

The review helped to identify the existing initiatives (studies, projects, evaluations, etc.), the models, methods or approach undertook in these initiatives. Recommendations of these initiatives were reviewed carefully. Under the CLIFMA, these recommendations and lessons were also considered and outlined as design inputs for the DMIN designing phase and utilized to set a methodology for the pilot testing. A synergy and comparative overview of these initiatives is reported table 3-1.

Table 3-1. Comparative review of selected local level EW initiatives in Bangladesh.

Initiative	Major Hazard focus	Dissemination mode-protocols suggested	On parallel dissemination flow for EW	NGO involvement	Key focal local institutional entity recommended
CPP initiative	Cyclone (also Tsunami recently)	VHF radio, CPP volunteers, collaboration with local setup	Emphasis on existing CPP-BDRC and collaboration with Govt. system	BDRC, CPP and Govt. entity involvement recommended	CPP units and volunteers
CFIS/CFAB project	Riverine flood	SMS and Fax; flag hoisting	Parallel dissemination flow recommended upto union system and flag operators	NGO network and Local NGO involvement recommended	Union Parishad and Union Disaster Management Committees
CEGIS-BDPC (LDRRF in Lalmonirhat) project	Multi-hazard (Flood, drought, Cold spell and erosion)	SMS and Fax; flag hoisting. 5-days lead-time is operational	Parallel dissemination flow recommended upto union system	Recommended	Union Parishad and Union Disaster Management Committees and Ward Disaster Management Committees
BDPC and FFWC	Riverine flood	SMS and Fax; flag hoisting	Parallel dissemination flow recommended upto union system and flag operators	Local NGO involvement also encouraged	BWDB Local Flood Cells (along with the District and upazila administration was recommended). Union Parishad and Union Disaster Management Committees and Change Agents are recommended for

Initiative	Major Hazard focus	Dissemination mode-protocols suggested	On parallel dissemination flow for EW	NGO involvement	Key focal local institutional entity recommended
					local level.
CNRS Flash Flood under LDRRF	Flash flood	1-2 and 3 day lead-time requirements shown. Talked about a need for a communication plan. Specific protocols are not specified.	FFWC/BWDB and IMD/Indian universities' collaboration suggested	Recommended. Also recommended collaboration with IMD and other regional entities	UP, UDMC and Volunteer groups are recommended.
ActionAid-BDPC project	Flood	SMS and Fax; flag hoisting	Parallel dissemination flow recommended upto change agents	Partner NGO involvement recommended	Union Parishad and Union Disaster Management Committees and Change Agents are recommended
BUET study under UNOPS and CDMP	Cyclone and Tsunami	WorldSpace Satellite system	Parallel dissemination flow recommended upto community and remote areas	Technical solution directly to community recommended	
KU-ADO under LDRRF	Multi-hazard (but cyclone major)	SMS, Fax and Cell phone based system developed	Parallel dissemination flow recommended upto union and ward volunteers	Recommended	Union Parishad and Union Disaster Management Committees and Ward representatives are recommended
CEGIS-BWDB/JMR EMP initiative	Riverbank erosion	Fax, maps and flag hoisting in vulnerable areas	Parallel dissemination flow recommended upto union system	Recommended	Union Parishad and UNDMC are recommended

3.1.1 Cyclone Preparedness Programme (CPP)

The Cyclone Preparedness Programme (CPP) initiative is one of the leading efforts for cyclone early warning and management in the region. For generating EW, primarily, the programme receives a warning message first from BMD (Storm Warning Center) and then from DMB, DRR, MoFDM and other stakeholders by Fax. CPP disseminates the cyclone and storm related early warning to their thirty two well established CPP field offices and coordinates at the local level through a well-organized volunteer structure of CPP and BDRCS. The programme has been operating for more than thirty years and still remains as the major model of cyclone preparedness and EW dissemination in the coastal region of the country. The programme in coordination with BDRCS, DMB, DRR, local government and all levels of disaster management committees try to make preparations for evacuations in the coastal areas of the country. Shelter management, social work, first-aid service and coordination with the local government are also standard activities of the programme. CPP has formed an information dissemination network which could be strengthened through active association with the DMIC and proposed DMIN.

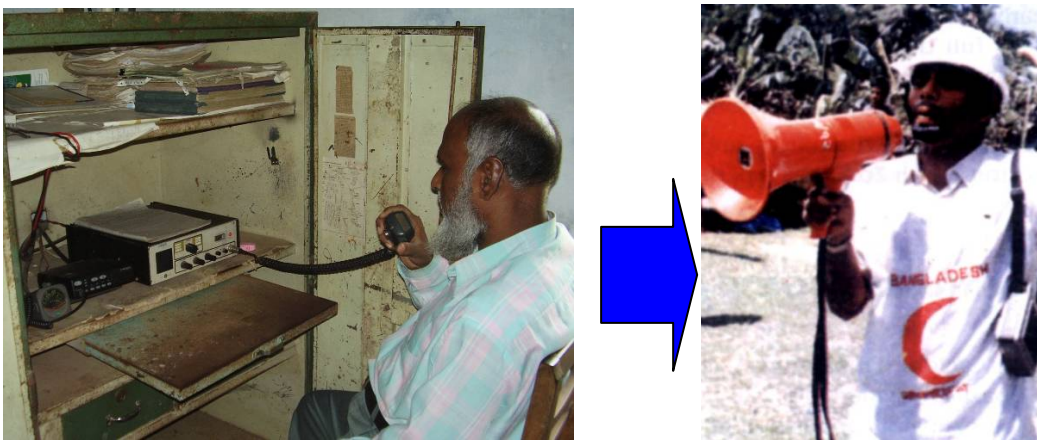


Figure 3-1. Local level dissemination system of the CPP.

The CPP has encouraged community based volunteerism and works through a voluntary mechanism at the community level where a big success has been observed in recent times in saving lives of the people in the community. The simple public dissemination system developed by the CPP and its institutional mechanism involving the local volunteers remained as the major success of the initiative. The hand mikes and megaphone type of public address systems have been a popularly used to reach out to the communities as a mode of local level dissemination.

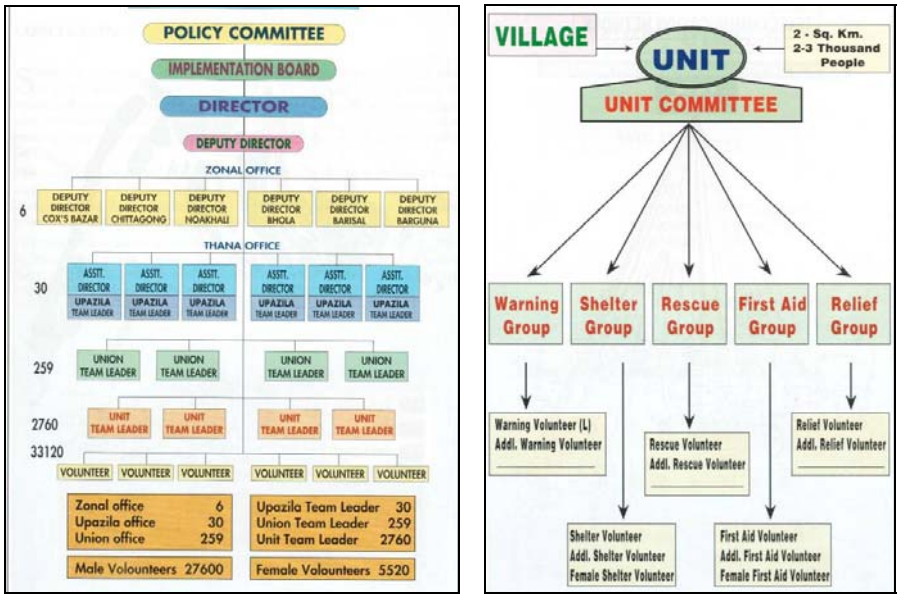


Figure 3-2. The institutional setup of CPP.

One of the challenges faced by the CPP program in recent time is its fullest coverage to safeguard people's livelihoods besides their life. In this respect, further additional development of this type of people centric community level early warning and to expand measures to protect people's livelihoods (e.g. saving standing crops, households assets) would be a major value added initiative.

3.1.2 CFIS/CFAB facilitated flood EW information network

The Community Flood Information System (CFIS) has been experimented in recent time under various collaborative initiatives under by BWDB, WARPO, Riverside Technologies Inc., CEGIS, USAID, CARE, ADPC, BDPC and EMIN (from 2001 onward). The CFIS initiative aimed to disseminate information on the flood extent, duration and depth of water to the communities before a flood occurs. The system was based on a GIS-based flood forecasting information software called WATSURF, which uses a correlation model of a 248 square km study area. It is a simple gauge-to-gauge correlation-based tool that uses forecasted water levels from the FFWC as input. The calculated water levels are then used to generate flood water levels in the study area using GIS technology. The conceptual diagram of the CFIS is shown in Figure 3-3.

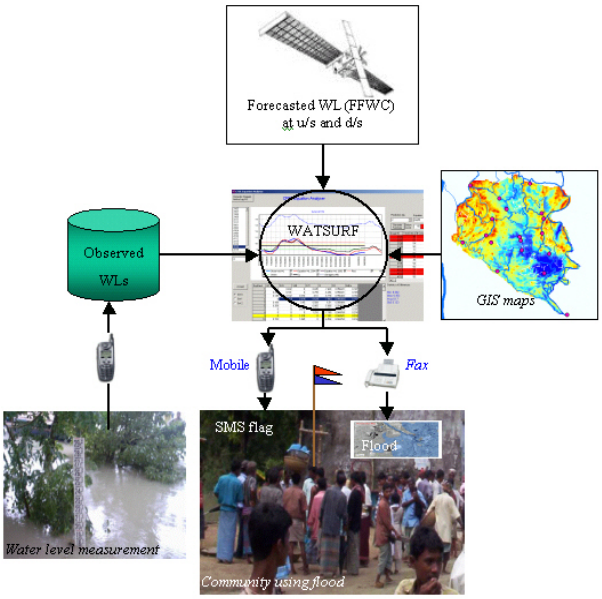


Figure 3-3. CFIS/CFAB information flow and dissemination process.

The CFIS system disseminates flood warnings to the pilot areas in a unique way. Selected individuals in the community serve as the operators to receive a daily text message with flood warnings and operate the flag system and bulletin board to inform the community of the flood warning. The message and symbols were designed with participation of the local people. The initiative has helped raise some level of awareness amongst local people about flood forecasts and warnings. Flood warnings are conveyed to local people by change agents and volunteers who explain the implications and interpretation of different types of warnings and help with flood preparedness. At the union level in the community UP members and chairman plays a central role in relaying the messages out to the local agents, volunteers, traditional leaders, teachers and a host of destination points. The warning messages then reach the farmers and community households using local modes of communications. At the village level, the flag system is also often used.

In recent times, the CFIS model has been taken even further through an active collaboration between ADPC, CARE, CEGIS, IWM, CFAN, G-Tech, USA, ADPC and FFWC and has been further piloted and specified with a relatively longer lead-time forecasting system. The CFAB has advanced the method to a greater number of areas as well as the extent of lead-time along with interpretation of the forecasts for the agriculture sector and safeguard of crops and other properties through the active involvement of the communities and local level institutions at the ground level.

Figure 3-4. CFIS/CFAB information flow and dissemination process.

This particular initiative has a good potential to be considered as a national system, particularly in the riverine systems. Gradual developments can be made on a basis and river specific zones for further refinement and increase of lead time. The dissemination system (some examples are shown in Figure 3-4) developed under this process also acknowledges the union systems (UP and associated Union DMC) as major stakeholders for community based early warning at the ground level. These are encouraging examples and are also derivatives for DMIN design.

One of the challenges this initiative has demonstrated is the flood information for the areas beyond or far from the riverine areas. The geographic locations that are inland from the riverine areas are yet to be covered/tested under this initiative. People often want to know more information on flooding beyond the river water level. Also, the initiative is based on a cellular communication for relaying the flood forecasting information to the community. This can be further simplified for a further widespread expansion using more community level modalities.

Expansion of this type of initiatives in other river systems remained as another challenge for future. However, national take up of such a promising initiative would be important step where DMIN and DMIC could play a good role in mainstreaming this type of initiative with the other DRR and development initiatives in the country.

3.1.3 CEGIS-BDPC-LDRRF/CDMP initiative on multi-hazard Early Warning Dissemination System

The Early Warning Dissemination System (EWDS) initiative was developed by CEGIS (through a partnership with BDPC and OVA) under the LDRRF of CDMP in Lalmonirhat district. The initiative points out that the early warning system in Bangladesh has yet to be improve a lot to become effective for people at risk. The initiative identified that the main reasons for that are: a) limited access of the local people to media used for warning dissemination, b) very little understanding of people in remote areas of early warning messages, c) the forecasts are not area specific, and d) the level of credibility of the national forecasts is low.

This community-based all hazard early warning dissemination system was developed in a participatory way by BDPC and CEGIS for slow onset, slow seasonal onset and seasonal onset hazards. The warning dissemination system addressed cold wave, drought, flood and river bank erosion hazards in the demonstration areas of Sadar, Kaligonj, Hatibandha, Aditmari and Patgram of Lalmonirhat district.

A volunteer group, Ward Warning Dissemination Committee (WWDC), was formed for each of the selected five pilot wards. The WWDC contains 20 representatives from a variety of socially active groups including a number of women. The developed EWDS pathway uses existing three tier administrative layers (DDMC, UzDMC and UDMC) and WWDC for piloting EWDS through mock drills. The mock drills produced promising and encouraging results regarding warning dissemination. People's interest and receptiveness of the system testify to the success of the community-based initiative to establish a warning dissemination system.

The following participatory warning dissemination pathway was followed (Figure 3-5):

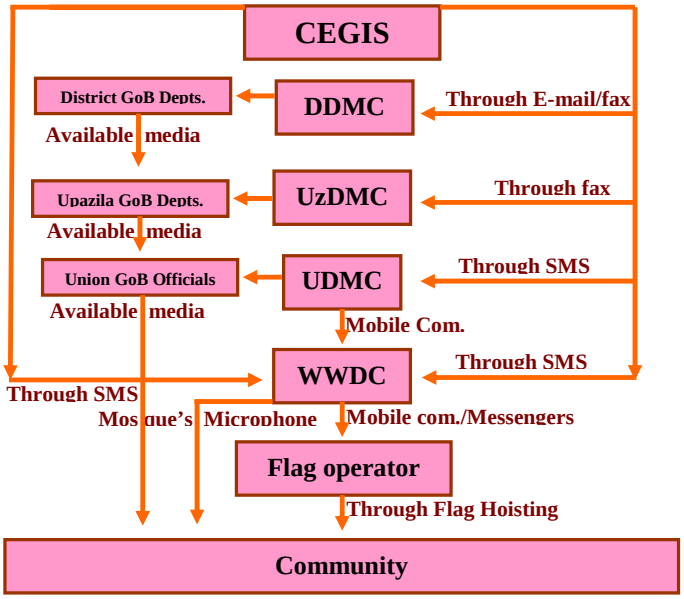


Figure 3-5. The pathway and mode of warning dissemination developed under this project.

The multi-hazard messaging system package suggested under this project is based on the following format (Table 3-2):

Table 3-2. Multi-hazard messaging format developed by CEGIS.

Message Receiver	Name of Location (Upazila/Union/Ward)	Hazard Specific Message				Media	Remarks
		24/03/2008		25/03/2008			
		Morning	Afternoon	Morning	Afternoon		
		Cold spell	Drought	Flood	Erosion		
Lalmonirhat DDMC	Patgram	C3	D1	F++	E3	Fax	Fax is rather preferable than e-mail as it is limited
	Hatibandha	C3	D1	F++	E3		
	Kaliganj	C2	D2	F+++	E2		
	Aditmari	C2	D2	F+++	E2		
	Sadar	C1	D3	F+	E0		
Patgram UzDMC	Sreerampur	C3	...	...	...	Fax	Patgram upazila is equipped with fax facility
	Patgram	C3	...	...	...		
	Jagatber	C3	...	...	...		
	Jongra	C2	...	...	...		
	Kuchlibari	C2	...	...	...		
	Dahagram	C2	...	...	...		
	Baura	C1	...	...	...		
Hatibandha UzDMC	Barakhata	C3	D2	F+++	E0	Physical communication	No fax facility is available
	Goddimari	C3	D2	F+++	E2		
	Shingimari	C3	D2	F+++	E0		
	Tangbhanga	C3	D2	F+	E0		
	Sindurna	C2	D3	F++	E0		
	Gotamari	C2	D3	F++	E0		
	Nowdabash	C2	D3	F+	E0		
	Patikapara	C2	D3	F++	E0		
	Dowabari	C3	D3	F+++	E3		
	Bhelaguri	C2	D3	F+	E0		
Kaliganj UzDMC	Madati	C3	D3	F+	E0	Physical communication	No fax facility is available
	Chandrapara	C3	D3	F+	E0		
	Goral	C3	D3	F++	E0		
	Dalagram	C2	D3	F+	E0		
	Bhotemari	C2	D2	F+++	E3		
	Chalbala	C2	D2	F+	E0		
	Tushbhander	C2	D2	F+++	E2		
	Kakina	C2	D2	F++	E0		
Aditmari UzDMC	Durgapur	C3	D2	F+	E0	Physical communication	No fax facility is available
	Bhelabari	C3	D2	F+	E0		
	Kamalabari	C2	D2	F+	E0		
	Saptibari	C2	D2	F++	E0		
	Sarpukur	C2	D2	F++	E0		
	Palashi	C2	D3	F++	E2		
	Bhadai	C2	D3	F++	E0		
	Mohishkhocha	C2	D2	F+++	E2		
Sadar UzDMC	Mogalghat	C3	D2	F+	E0	Physical communication	No fax facility is available
	Kulaghat	C3	D2	F+	E0		
	Pourasova	C3	D2	F+	E0		
	Mheandranagar	C2	D2	F+	E0		
	Barabarhi	C2	D2	F++	E0		
	Harati	C2	D2	F++	E0		
	Khunigach	C2	D3	F+++	E3		
	Panchagram	C2	D3	F++	E0		
	Gokunda	C2	D3	F++	E0		
	Rajpur	C2	D3	F+++	E2		
UDMCs	Jongra, Patgram	C3	D1	F++	E3	SMS	Chairmen and Secretary of UP
	Daoabari, Hatibandha	C3	D1	F++	E3		
	Bhotemari, Kaliganj	C3	D2	F+++	E2		
	Mohishkhocha, Aditmari	C3	D2	F+++	E2		
	Khuniagachh, Sadar	C2	D3	F+	E2		
WWDCs	Ward- 6, Jongra	C3	D1	F++	E3	SMS	Assigned persons in WWDCs received SMS
	Ward- 2, Daoabari	C3	D1	F++	E3		
	Ward- 1, Bhotemari	C3	D2	F+++	E2		
	Ward- 7, Mohishkhocha	C3	D3	F+	E0		
	Ward- 1, Khuniagach	C2	D3	F+	E2		

The initiative was highly motivated by the existing CFIS and CFAB initiatives, but in this case came up with a multi-hazard mode of packaging and disseminating at the ground level.

3.1.4 Improved Dissemination of Flood Forecasting and Warning (by BDPC and FFWC)

The Bangladesh Disaster Preparedness Centre (BDPC) and Flood Forecasting and Warning Centre (FFWC) of the Bangladesh Water Development Board (BWDB), with the assistance of the Danish Hydraulic Institute (DHI), jointly implemented a pilot project titled "Improved Dissemination of Flood Forecasting and Warning". The objective of the pilot project was to reach flood early warning to the local people of flood prone areas timely and effectively. The project addresses the up-gradation of the existing information system. The main interventions that have been made under the pilot project were a collection of recommendations for up-gradation of the FFWC homepage, strengthening of selected BWDB flood cells and developing and following-up on the community dissemination strategy. Under this intervention, Sylhet, Sunamgonj, Moulvibazar, Hobigonj and Gaibandha districts were selected considering the vulnerability of the districts to floods.

Based on the different level findings, BDPC strengthened selected BWDB flood cells at the field level in disseminating flood early warning, GoB departments, NGOs, media and communities were brought in linkage with BWDB Cells. This was done with an objective to improve the early warning and dissemination and access for the local stakeholders. The main stakeholders of the EW dissemination process were FFWC, BWDB, DDMC, UzDMC and UDMC.

The following EW massage flow chart was developed through the project for flood early warning transmission and community level dissemination (Figure 3-6):

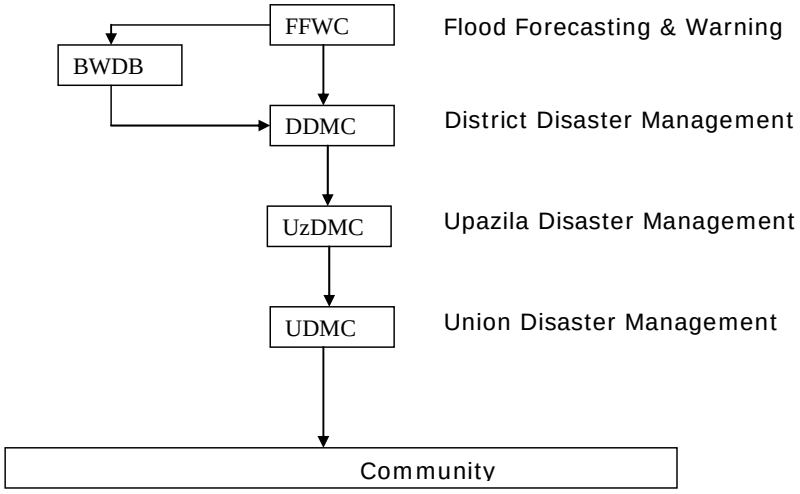


Figure 3-6. Institutional setup proposed in the BDPC-FFWC initiative.

All these stakeholders are linked with BWDB cells so that they act accordingly to save their work at the local level and disseminate the early warning messages as the BWDB cells can give early warning messages to them through the office of the Deputy Commissioners and DDMC. For example, the District Livestock Officer (DLO), Agriculture Department, District Relief and Rehabilitation Officer (DRRO), Education Department, and others have to downward transmit flood early warning for local level dissemination to save their work and plans in the community.

3.1.5 Early warning system for flash flood of Haor Basin in Sunamganj by CNRS

A study on "Adopting Early Warning System to Address Flash Flood in the Deeply Flooded Haor Basin in Tahirpur of Sunamganj District" has been undertaken by the Center for Natural Resource Studies (CNRS) for LDRRF under CDMP. The main objective of the study was to empower individuals and communities threatened by hazards, especially flash flooding, to act in sufficient time and in an appropriate manner to reduce the possibility of crop loss, loss of livelihoods, and damage to property and the environment.

The study reviewed the existing flood forecasting and early warning system practiced by FFWC. The review was done mainly to identify the gaps of this system. In the existing system, dissemination of flood forecasts and warnings is much weaker because there is no other organization with overall responsibility for disseminating flood forecasts and warnings to potential users. The study also reviewed the institutions related to flood forecasting and early warning system. FFWC, BMD, BWDB and DMB, among others, are the major institutions which have been reviewed to understand institutional roles and responsibilities, capacities and administrative structure for flood forecasting and early warning generation and dissemination. Furthermore, this study reviewed different types of early warning models based on two major approaches, the deterministic approach and the stochastic approach.

Analyzing these features, this study has provided an early warning system model as the main output of the study (Figure 3-7).

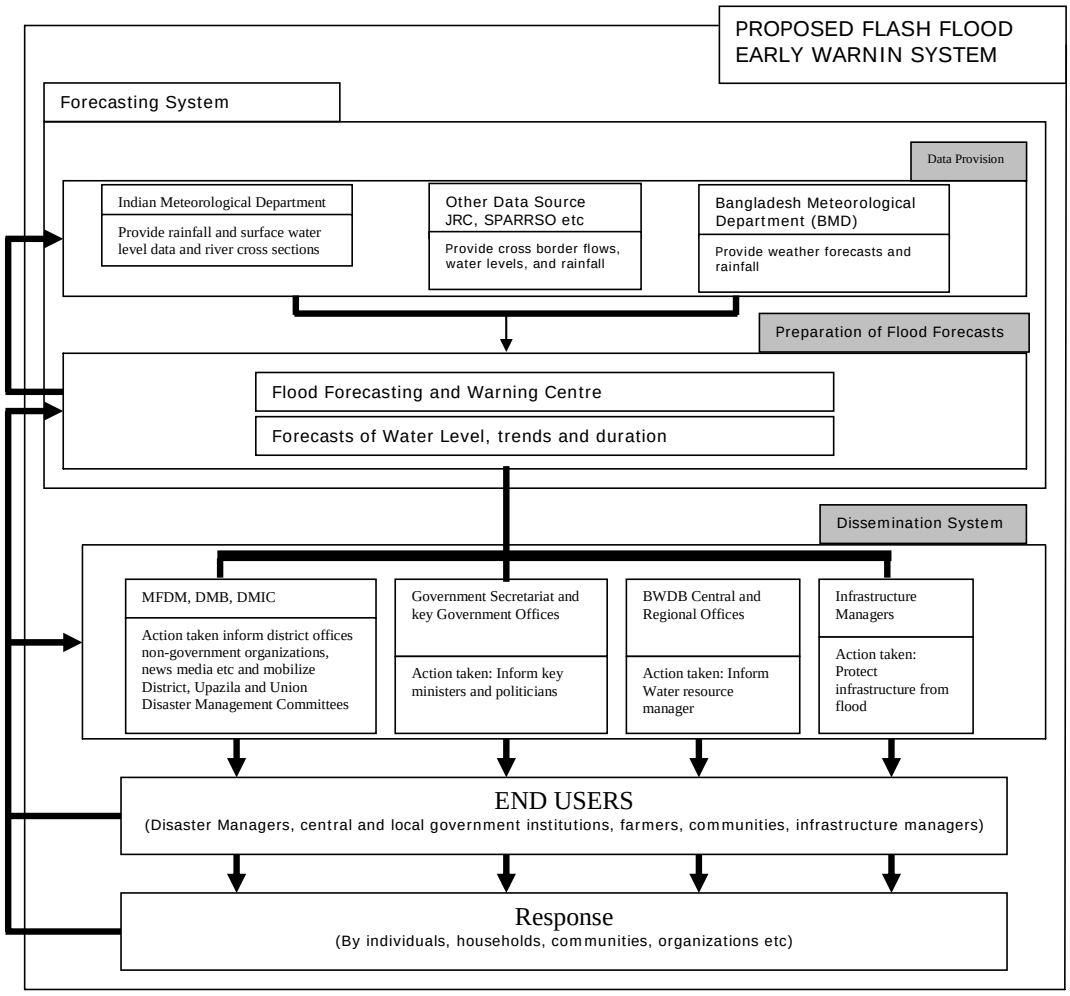


Figure 3-7. CNRS proposed EWS setup for flash flood.

Besides the consultation results, the study also looked at the geo-hydrological and hydrological characteristics of the north-east Haor Basin areas to understand the nature and impacts of flash flood in the north-east part of the country, as well as the Meghalaya Basin. Emphasis has been placed on the environment of the southern slopes, land cover, climatic conditions and monsoon mechanisms, the rainfall characteristics, factors affecting the distribution of runoff, runoff generation in experimental catchments, and an in depth assessment of soil erosion risk in one of the representative catchments.

3.1.6 Community based flood warning system study by ActionAid, Bangladesh and BDPC

ActionAid and BDPC implemented a community based flood warning system in four remote flood prone areas along the Jamuna river to strengthen flood warning at family and community levels to enhance coping capacities for adaptation to the impact of climate change. Some of the activities implemented are: sensitization to communities; formation of a flood warning dissemination groups and systems; identification of the danger level and flood marker places; sensitization of community and local Disaster Management Committees.

Under this activity, community sensitization activities were carried out using participatory social maps and villagers selected the flood warning dissemination groups and early warning dissemination plan. Women and disabled people were given special emphasis while selecting the group members. Flag hoisting systems were introduced for flood warning dissemination in a participatory way. Perceptions of the participants regarding flood danger level were gathered through interactive participation of all group members. Some of the danger levels developed by the community under this project are shown below (Table 3-3):

Table 3-3. Flood danger levels.

Village	Reference point	Intensity of flood		
		Normal	Moderate	Severe
Bag Bhaura	Local Mosque	When water level remains1.5 feet below from the plinth of the mosque ground	When water level remains at same level of the plinth of the mosque ground	Water level cross the level of the mosque ground
Char Konabari	Local Mosque	When water level remains 3 feet below from the plinth of the mosque ground	When water level remains1.5 feet below from the plinth of the mosque ground	Water level cross the indicator of 1.5 feet on the scale
Bhat- Dighulia	Local School	When water level remains 3.5 feet below from the school ground	When water level remains 2 feet below from the school ground	Water level cross the indicator of 2 feet on the scale
Char Koijuri	In front of mosque, Bazar road	5 feet below the Bazar road	4 feet below the Bazar road	Water level cross the indicator of 4 feet on the scale

In a similar manner, the participants selected the flag marker places in a participatory way. The key issues considered for selection of a potential places to be a flag marker are: visibility of the flag markers from each corner of the places; public places; and places near to the dissemination group members' houses. The dissemination flow suggested in this study is as follows (Figure 3-8):

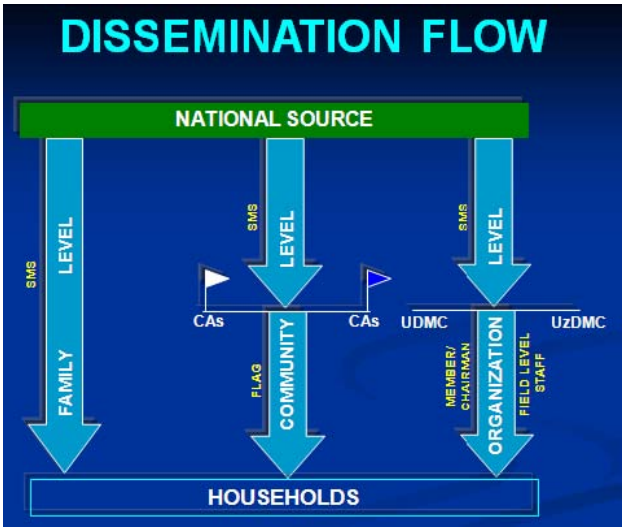


Figure 3-8. Dissemination flow suggested by the AAB-BDPC project.

To ensure the flood warning at family and community levels, multi channels, different stakeholders, and accessible media have been considered (Table 3-4).

Table 3-4. Messaging system developed under the project.

Level	Message Sender	Message Receiver	Medium
Family	FFWC via cell phone companies	Household level subscriber	Cell Phone
Community	FFWC via cell phone companies	Identified flag operators (Change Agents and volunteers, who have cell phones)	Cell Phone and Flags
Organization	FFWC via DMIC/DMB	Warning dissemination groups via Responsible Officials of DDMC, UzDMC, UDMC	Telephone, Fax, Cell Phone, Email, Messenger

3.1.7 Disaster early warning system for Cox's Bazar district by BUET

Under the UNOPS and CDMP collaboration, the Department of Civil Engineering of BUET has carried out a study on disaster early warning of Cox's Bazar district. In this study the existing early warning system for disasters in Cox's Bazaar district was looked at with a special focus on cyclone warning and tsunami early warning systems in the area.

The study carried out key informant interviews, group level evaluations through rapid rural appraisal methods and some questionnaire surveys. The study suggests that the early warning dissemination system for cyclone has been successful in reducing the loss of lives and property but there is a scope for improvement on the ground. The flag-based warning is not always understandable by the local community. Education among the communities through training programs and revision of warning messages needs to include more specific information about the intensity, target area, evacuation time and others. In this line, the study strongly recommended that a supplementary warning system improve the effectiveness and reliability of the system. It also recommended that this system appeared to be reliable and usable for a multi-disaster approach.

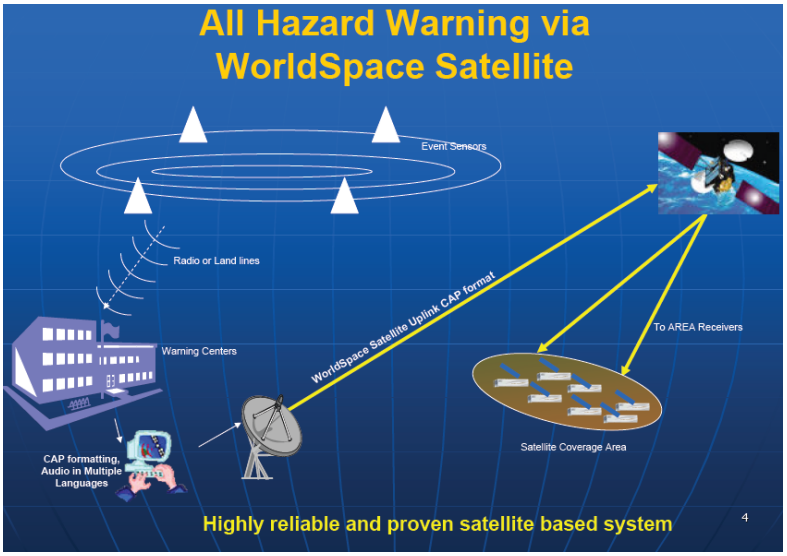


Figure 3-9. WorldSpace Satellite system proposed under the BUET Study.

In this study, the technologies and devices for the tsunami early warning system has been discussed and proposed based on a satellite based emergency early warning system and WorldSpace Satellite (Figure 3-9). Twenty sets of the systems have been deployed in the pilot areas and a dissemination system within 10 seconds of hazard occurrences has been proposed. The study recommends that this WorldSpace Satellite based system be able to disseminate warnings in different forms and information delivered can be chosen on the basis of the requirements of the different risk zones. It is able to disseminate warnings to remote areas where other networks of information transfer often fail.

The study also revealed that, even though the existing cyclone shelters in the country are insufficient to accommodate the huge population at risk, the shelters can be used for cyclone and tsunami hazards. The time to reach most of the shelters is 15-30 minutes. However, the study recommended that action is required on connectivity and security during a disaster period.

3.1.8 Community-based all hazards early warning dissemination system in Satkhira by ADO-KU

A community based early warning dissemination system (EWDS) was implemented under the LDDRF, CDMP by the Urban and Rural Planning Discipline (URPD), Khulna University in Assasuni upazila of Satkhira district. It was pointed out by the project that most of the communities in project area were found to have very little awareness about the effects of disasters like salinity increase and arsenic contamination. Under the project, a protocol/messaging system was developed and a dissemination mode for people's involvement was identified. Some of the details of these developments under the project are as follows.

Protocol/messaging system

- Clearly understandable Warning message templates have been developed in Bengali for mobile sets.
- UzDMC and UDMCs have been sensitized about their roles and responsibilities pre, during and post disaster situations and also about their roles in disaster warning dissemination through workshops and courtyard meetings.
- Capacity to disseminate disaster warnings by DMCs have been increased by providing them logistic support.

- In Total 110 (10 local volunteers from each union) have been trained about various disaster management and to disseminate disaster warnings quickly.
- A training manual and a number of leaflets have been published.

Dissemination mode and People's involvement

- Fifty five mobile sets have been distributed among the volunteers to enhance their capacity to disseminate disaster warnings. One GPRS enabled mobile phone was given to the UzDMC chairman.

- A network has been established among the Chairman of UzDMC, Chairman of UDMC and volunteers. Customized text message templates have been developed for easy and quick dissemination of disaster warnings.

The communities in the project area were found to have a very minimum understanding about the disaster warnings such as cyclone warnings and flood warnings. Various trainings imparted to the UDMC members, and local volunteers from the project helped increasing their understanding. The mindset of the Union Parishod Chairmen members were found to be very 'reactive'. They were eager to get 'tangible' material support rather than increasing their capability through 'management trainings'. Breaking this mindset had been a real challenge for this project. Rapport building and continuous communication with them by the project staffs, and establishing DICs under their supervision had been found to be very effective in overcoming these difficulties.

Figure 3-10. Cyclone code related awareness materials produced under the project.

The methodology and approach of the URDP-KU initiative are outlined in the following diagram (Fig 3-11):

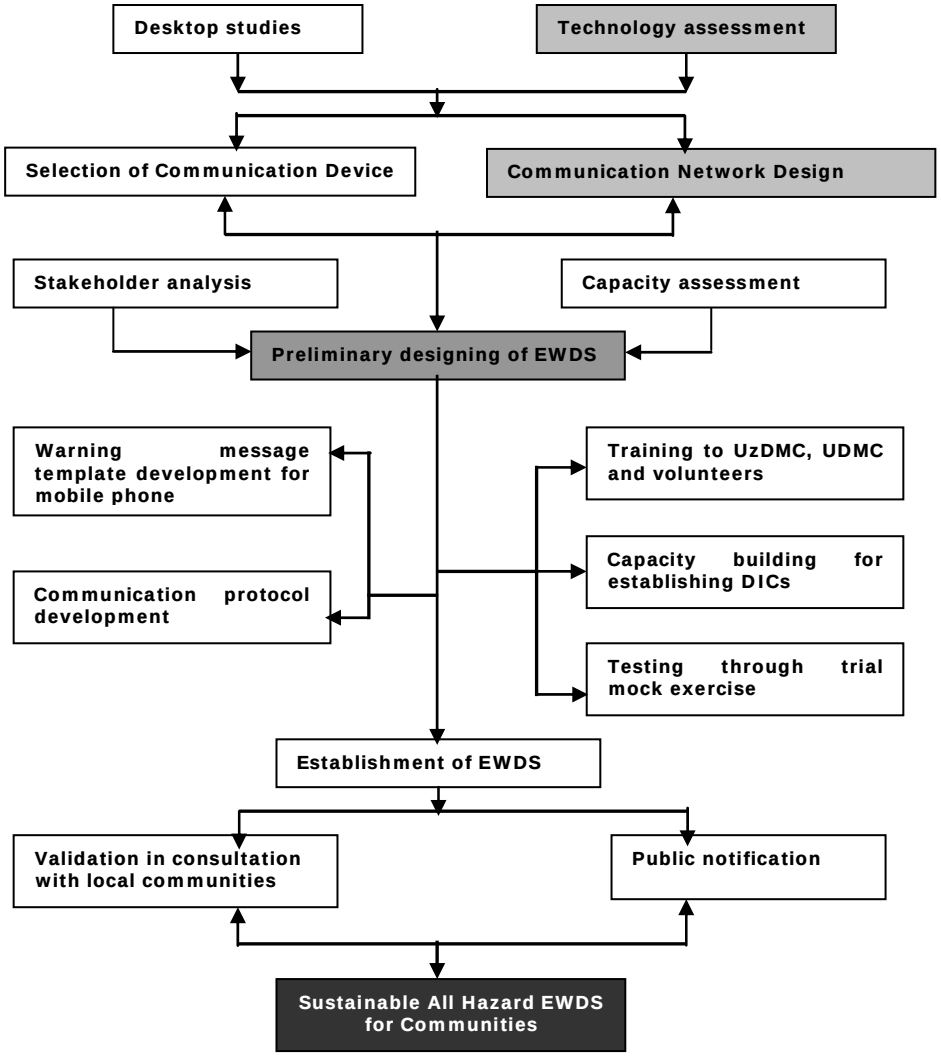


Figure 3-11. Methodology and approach of the URDP-KU project.

Some of the recommendations and lessons learned by the project are as follows:

- With proper guidance, communities can be extremely effective in accurately mapping out their resources within the communities;
- Disaster management committees both at the upazila and union levels are either non-existing or non-functional as there was no effective monitoring mechanism in place to monitor the activities of such committees;
- For quick and efficient dissemination of disaster warning, a community-based network of people was very effective and should include UzDMC, UDMCs and local volunteers;
- With minimum logistic support and trainings, UzDMCs, UDMCs and local communities can be brought into an effective network for disseminating disaster warnings;
- Local government institutions can be an effective agency for disaster warning dissemination, but their effectiveness can be reduced due to resource constraints;
- A trained set of local volunteers equipped with a modest communication device for communicating with the UzDMC and UDMC could be effective in disseminating disaster warnings;
- Pre-designed separate text message templates for different types of hazards are useful for speedy dissemination of disaster warnings;

- For hazards like cyclone and flood no warning generation is possible at the local community level, but through the proposed system, generated warnings could be rapidly disseminated down to the household level;
- Cultural activities with participation of local performers can be a very effective mechanism for awareness building of local communities; and
- Capacity building of local government bodies is extremely essential for speedy dissemination of disaster warnings.

3.1.9 BWDB-JMREMP initiative for riverbank erosion

In the Jamuna and other river major systems BWDB with CEGIS has stated developing a local level erosion prediction method. At the local level, localized river erosion vulnerability maps were demonstrated in the union parishad, UNO offices and other public places. These products were found to be understood to a significant level by the local communities, particularly by the local government representatives. Furthermore, area wise demarcation of vulnerable zones was tried out using flags in the most vulnerable areas. The local government representatives along with the BWDB local officials were in charge of managing these flags and the dissemination of information among the local communities for preparedness and voluntary resettlements. However, there is much remaining before this pilot based erosion information can be taken to a greater scale. Some of the erosion vulnerable maps produced are shown in the figure 3-12.

For river bank erosion prediction, the BWDB with support from CEGIS developed a morphological and riverbank erosion prediction method based on satellite images. Since 2002, this kind of prediction has been generated through predicting morphological developments in the Jamuna River at the Pabna Irrigation and Rural Development Project (PIRDP), and FAP 21. From 2004 onwards, BWDB-CEGIS has been predicting the bank erosion along the Jamuna and Padma rivers yearly under the framework of the Jamuna-Meghna River Erosion Mitigation Project (JMREMP) and the Environmental Monitoring and Information Network for Water Resources Project (EMIN).

The system has exemplified the value of involving the local government (UP) and the UNO in the overall process of planning and regimentation for slow onset disaster preparations on the ground. This could be a good example for slow onset hazard planning and network development and can be linked up with the DMIC at upazila levels in the future.

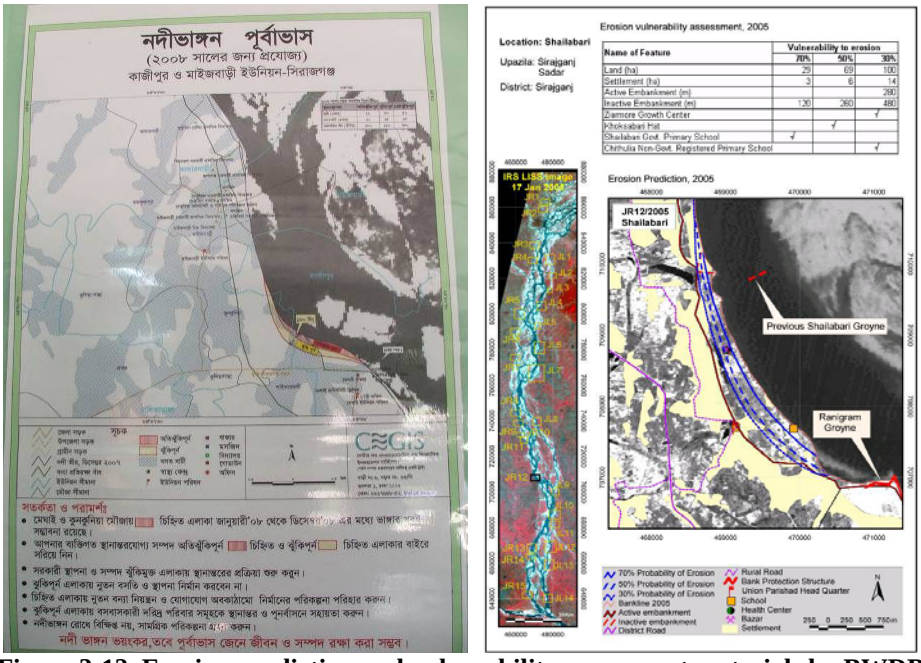


Figure 3-12. Erosion prediction and vulnerability assessment materials by BWDB.

3.1.10 DMIC Needs Assessment by CDMP

Besides these above mentioned early warning system related project/initiatives, another initiative worth mentioning is the DMIC Needs Assessment Report published by CDMP. It has considered various layers of information on needs and scopes for community level early warning and also talks about how these capacities can be enhanced in future EW initiatives in the country. Although, the assessment has conducted in a shorter period some useful information has been compiled in this report which has good relevance of background understanding of the existing situation of the community level early warning situation in the country. The assessment report has considered three dimensions as scopes: a) hazards managed, b) stakeholders served, and c) disaster management phases handled. In terms of hazard, it covers cyclone including storm surges, flood (river and flash flood), earthquake, erosion and drought considering various issues of needs.

The DMIC Need Assessment Report has provided compiled information on national level institutional needs, community and local level institutional needs, assessment on information products, ICT infrastructural needs and provided an analysis of the ICT capacities and gaps. The report has examined and categorized the various EW issues with respect to: a) daily operations of the DMIC, b) risk assessment, c) risk reduction, d) early warning and emergency response, and e) disaster recovery.

The assessment has expressed a necessity for more effective and better coordinated information management systems with a goal to improve coordination among agencies at all levels for easy access to appropriate, timely and accurate information before, during and after emergency situations. It has pointed out that the Emergency Operations Centre (EOC) of the Ministry of Food and Disaster Management (MoFDM) is the responsible agency for coordination but is ill-equipped and lacks adequately skilled professional staff to carry out its required functions. Without modern telecommunication networks and integrated management systems, the EOC depends on district and Upazila authorities to report critical information for decision-making using traditional communication methods that delay response.

3.2 Challenges and gaps in existing initiatives

From the review of these existing initiatives several challenges and gaps emerged. Some of these are as below:

- **Geographical specificity:** The flood related early warning systems are found to be well developed and largely dependent on the river water level monitoring systems particularly along the Brahmaputra and the Ganges river systems. It is often pointed out that the geographic locations that are inland from the riverine areas are yet to be covered/tested for community level early warning systems. People often want to know more information on flooding beyond the river water level.

- **Cell phone based EW systems:** Cell phone and SMS based systems for flood early warning is in its initial stage. This can be further developed with a national system with innovative but simple messaging systems. Some of the examples of sms protocols are developed for the local facilitators but how these can be more popularized for the household level and common users needs to be thought of.

- **Consideration of livelihoods protection issue:** For cyclone early warning the CPP led system has already been proved to be very effect for saving lives. However, one of

the challenges faced by the CPP in recent time is its fullest coverage to safeguard people's livelihoods besides their lives. In this respect, further additional development of this type of people centric community level early warning and to expand measures to protect people's livelihoods (e.g. saving standing crops, households assets) would be a major value added initiative.

- **Sustainable enabling institutions:** One of the key questions identified in most of the initiatives is the issue of sustainability of the community based early warning system in a low cost but effective sustainable system that can be managed by the communities themselves. Among the existing initiatives some of the examples particularly the institutional setups in this line are tested. These needs further testing in the post project/initiative stage when the project led functions are phased out.

- **Sustainability of the network in non-emergency time:** Most of the initiatives promoted the systems for rapid dissemination and even led forecast dissemination protocols. These projects have also come up with innovating ideas of early warning dissemination in respective contexts. However, how in the regular time (in not emergency mode) these systems will function or sustain needs greater clarification and remains as a challenge.

- **Household level early warning information flow:** In most of these initiatives the early warning systems are considered as a system to inform rapidly upto the Upazila or upto Union layers. However, how early warning information will flow in different situation is a relatively least studied area. But the how people react at household level after receiving early warning has always been a critical point of query for community level early warning dissemination and response.

- **Linked connectivity with a central national dissemination system:** In almost all the previously discussed initiatives, it was found that the suggested community level early warning systems are largely connected to the piloted agency or two major national sources such as BWDB/FFWC for flood and BMD for cyclone. However, for national coordination from the MoFDM a central control room for active dissemination of the institutional early warning system a central control room from DMB in the forms of future DMIC is not often connected. A central need for DMIC has already been documented in various documents including the DMIC Needs Assessment Report.

The above specified gaps and challenges of the existing early warning systems are briefly discussed in the light of scoping the CLIFMA contributions as well. CLIFMA with its multiple-layer of investigation and follow up field testing through piloting DMIN design can contribute to these layers in an integrated manner. Making synergies of the existing good examples and making a central level connection with the DMIC, the present CLIFMA initiative can provide useful contributions for national level standardization.

The CLIFMA findings from household and community level is therefore is a value added element of the standardization of the national community level early warning systems for piloted hazards as well as with the in-depth study findings from the various districts and hazard area can contribute towards national replication of the good/better practices that have already started.

Chapter 4. CLIFMA findings: Community and household level

The CLIFMA household survey was conducted among the 800 sample households from 25 communities in 20 districts focusing on seven major hazard prone areas. The communities were selected in relation to the hazards in order to cover a wider possible hazard context of early warning dissemination of rapid onset, seasonal onset and slow onset hazards. In the survey, a wide range of variables were covered to generate household and community level contexts of early warning. Issues of early warning access, availability, usefulness, mode of communication, understanding, preferences, reliance, quality, efficiency and a host of other indicators were included. The survey coverage is reported in Table 4-1. A total of 800 households are taken as sample for the study with a "purposive sampling strategy". After interviewing households in each hazard prone community, community level focus group discussions were carried out to get the respective community's perspectives and views towards the key early warning issues.

In this chapter, the discussions are structured in three different sections. First, the general characteristics of the households interviewed are discussed, and then the discussion organised into a hazard-wise manner so that the findings for each hazard early warning can be reported specifically. Finally, some of the general and cross-cutting early warning issues are discussed at the end of the chapter. The major indicators covered under the CLIFMA household survey are reported in the methodology chapter (Chapter 2) of the report.

Table 4-1. CLIFMA household survey coverage.

District	Upazila	Union	No of of Households surveyed
Bagerhat	Mongla	Mithakhali	32
Bandarban	Bandarban Sadar	Ward No-09	32
Bhola	Char Fasson	Hazariganj	32
Bogra	Dhunat	Bhandarbari	32
Chandpur	Chandpur Sadar	Ibrahimpur	32
Chittagong	Anowara	Roypur	32
Chittagong	Hathazari	Forhadabad-Hathazari	32
Cox`s Bazar	Maheshkhali	Chhotamohes Khali	32
Gaibandha	Fulchhari	Uria	32
Habiganj	Lakhai	Bulla	32
Kurigram	Ulipur	Hatia	32
Manikganj	Shibalaya	Shibalaya	32
Naogaon	Sapahar	Sapahar	32
Nawabganj	Nachole	Nachole	32
Pabna	Bera	Kaitala	32
Pabna	Pabna Sadar	Bharara	32
Pabna	Sujanagar	Nazirganj	32
Patuakhali	Kala Para	Lata Chapli	32
Rajshahi	Bagha	Gargari	32
Rajshahi	Godagari	Gogram	32
Satkhira	Shyamnagar	Munshiganj	32
Sirajganj	Kazipur	Kazipur	64
Sunamganj	Bishwambarpur	Dakshin Badaghat	32
Sylhet	Balaganj	Balaganj	32
Total Dist = 20	**Total Upazila = 25**	**Total Union = 25**	**Total Households = 800**

4.1 General characteristics of the sample households

In this section a general description of the sample survey households are given to have a generic picture of the households covered under the CLIFMA study. A full-scale statistically representative sampling for selecting these households are not attempted but to get a maximum possible diversity within the selected sample households a "purposive sampling" was carried out to include the major social-diversity categories of the population adopting the major well-being (type of households) types from the community as well as hazard-wise affected community selection. Including all the diversity ultimately increases the representativeness in general. In this line, to consider substantive diversity of the households, the sample households were taken from four major types of households reflecting their well-being status. The four types are always deficit, occasionally deficit, break-even and well-off households. These four types of households are considered to represent a full spectrum of social and economic diversity which exists among the rural Bangladesh community. To reduce the gender specific sampling errors of the respondents half of the households are interviewed from their women members but the information asked to represent their overall household status and perceptions.

Primary occupation

Among the sample households, it was found that a large number of household heads are associated with primary occupations that are very much dependent on the land and water systems. Among the sample households almost 45% of the households are associated directly with agriculture and farming. Among the households about 14% of the households are either involved with wage labour (combining both agricultural and non-agricultural wage labour) and various types of trading, business and services. A total of 6% sample households are fishers. However, among the other occupations fishing was also found as a secondary livelihoods activities but usually such households prefer to indicate their households by their primary occupations such as farming or wage labourer. Some fish businessmen are also there but they identified themselves as traders. Almost one fifth of the households are involved with range of occupational activities such as students, dependent or remain unemployed. The detailed account of occupation diversity of sample households are shown in the table 4-2.

Table 4-2. Primary occupations of the household heads of the sample households.

Occupational groups	Number of sample households	Percentage of total sample
Agriculture/Farming	359	45
Fishing	44	6
Traders/ businessmen/services	114	14
Wage labour	115	14
Others	168	21
Total	800	100

Sex and Age distribution

In terms of sex composition of the household members, it was reported that almost 47% are female and rest of the 53% are male. Within the households, a large number of household members are reported to be young and falls into the age within 10-20 years. There is a significant percentage of people seems to be of the age over 50 which indicates that a significant proportion of the household members are elderly in the sample community. The figure 4-1 reports the sex composition and figure 4-2 reports the age distribution within the sample households. From this it can be concluded that in a typical household, the significant number of household members are either young or elderly. In one sense it can be concluded that these two groups are both relatively vulnerable to various types of disasters more easily comparing to the middle aged people in the community. A big proportion of people of vulnerable age are thereby an existence in the sample study communities.

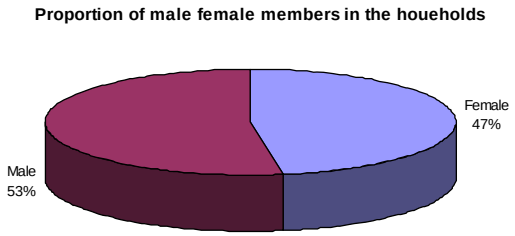


Figure 4-1. Male-female proportion in HH.

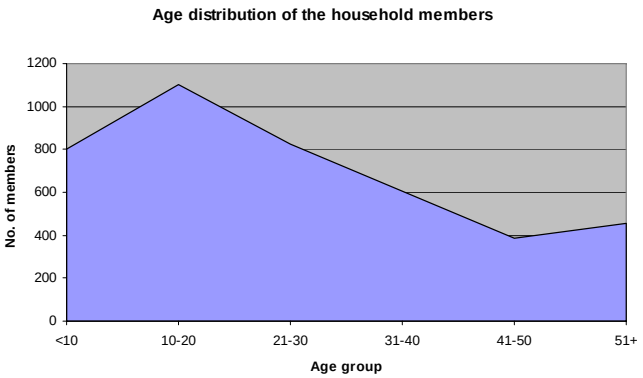


Figure 4-2. Age distribution of the HH members.

Education

In the sample households, the education level of the heads of households were also analyzed. Most of the household heads were found to with below the level of a high school education, while almost 31% were illiterate, and about 19% had only non-formal education/literacy and about 21% had education upto class 5 (primary education). Among the household heads, about 23% had studied over class five and within that around 17% had passed the HSC (Figure 4-3). The figure shows that the households have a low education level in general.

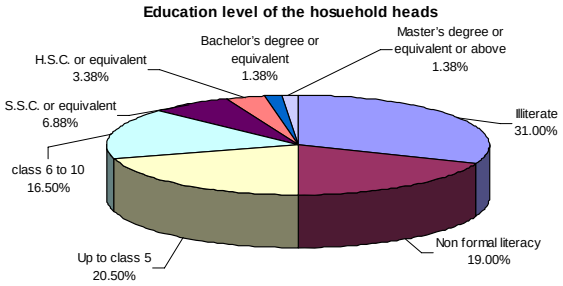


Figure 4-3. Education level of the household heads.

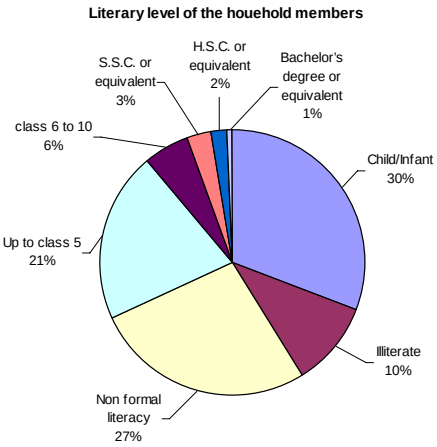


Figure 4-4. Education level of the household members.

Among all the sample household members, it was found that a quarter of the proportion of people apart from children or infant has non-formal literacy and a proportion of 10% is also illiterate and including the above mentioned almost half of the households have education below high school. The data exemplifies a relatively low education status among the household members in the community is an existence. The education level of the sample household members is shown figure 4-4.

Income, expenditure and poverty status

Among the sample households most are found to be having an annual income range from 10 thousand to 80 thousand taka. Income-expenditure variations are found a little stressing among the 50-90 thousand per annum groups. This is often due to the low return from the cultivable land which often remains affected by various hazards. The income expenditure bands of the households are shown in figure 4-5. As per conventional standards (following the US "dollar a day" approach and "two dollars a day" level), most of the households fall in between income level "one-two dollar a day" band which is approximately equivalent to BDT. 25,000 per annum to upto around BDT. 50,000 per annum band. The following figure shows a general distribution of the surveyed households and their income status in this overall income-expenditure spectrum.

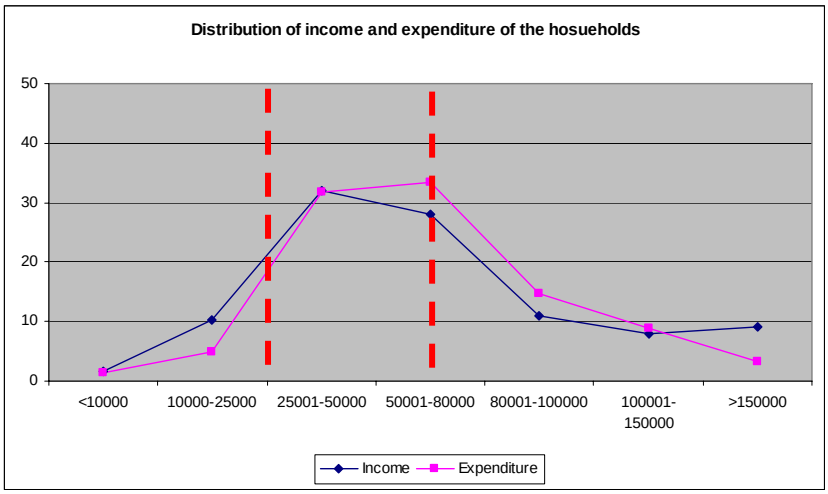


Figure 4-5. Distribution level of income and expenditure compared of the households (BDT).

Primary hazard faced by the households

The households are requested to indicate about their primary hazard faced irrespective to which hazard-area they live in. Analysis of responses from all 800 sample households dispersed in 20 districts revealed that the households perceive riverine flood as the prime hazard (about 30% of the total number) for their respective households. Cyclone/storm surge and riverbank erosion were identified as the second and third most affecting hazards for their households. The figure 4-6 gives a detailed account of the other hazards they perceive as primary.

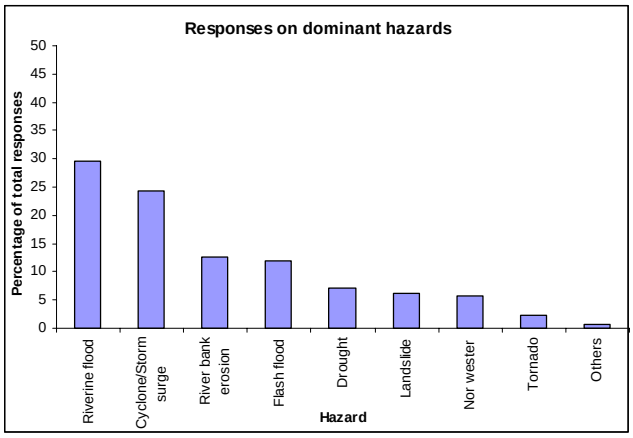


Figure 4-6. Responses on the dominant hazards perceived by the households.

4.2 Hazard specific findings

4.2.1 Findings from "riverine flood" prone areas

In the flood prone areas, it was found that EW information on people is expressive to the need of timely early warning and needed risk information specific to their respective areas. People primarily want to know when the flood is coming, what would be the duration of the flood, what would be flood water height, and other related information.

People seem to have a reliance on both formal/institutional and indigenous types of early warning. The formal/institutional type of early warning here refers to the official early warning that comes from any government authorized agency such as FFWC-BWDB in the case of riverine flood. Although the formal early warning is often regarded as the only form of early warning by the officials and institutional representatives, socially the communities also identify the indigenous type of early warning as a key type that people themselves practice heavily. In many cases, the specificity and accuracy in the context of the local situation and geographic area are often lacking in the formal/institutional type of early warning. For example, at the present, FFWC is providing flood forecasting that is dependent on the river water level observation. This often does not cover all the geographical areas as these are more related to river water levels only, thereby limiting the accuracy at some geographical areas. In such cases, people often largely rely on the local understanding of the river and various indigenous modes of early warning. Some of the local indigenous methods applied by the local people for riverine flood are as follows:

- People often rely on the observation of the wind pattern to indicate the flood increase (i.e. if the wind blows from south to north during the monsoon period then the water level may increase in 2-3 days);
- People often observe the movements of animals and insects to have idea on the water increase or decrease in the river water level, for example if insects move fast and come out of their earthen holes, then there is a possibility of increasing flood water levels in the near proximity;
- Monitoring of river water waves and levels has been a standard practice as well;
- People tend to measure the water level with various local based measuring sticks/staffs such as bamboo sticks;
- Observation of the cloud movements remain another form of indigenous prediction method that is used by the local community; and
- Some people also suggested that if the water temperature is cooler, then the water level may go up during the monsoon time.

However, the accuracy of these indigenous types of riverine flood predictions can be questioned at times, but local people, in the absence of any accurate formal early warning system, often rely on these methods combining one method with another.

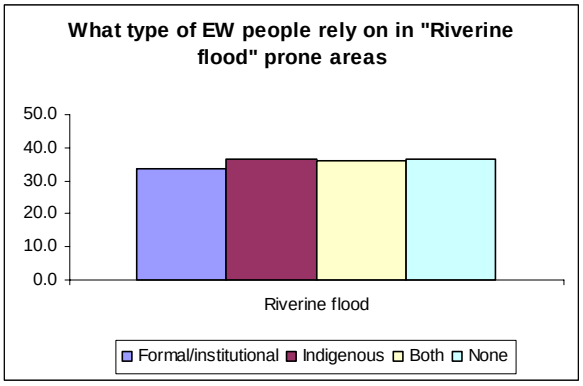


Figure 4-7. Type of EW people rely on at the HH & community levels in riverine flood prone areas.

The above figure (4-7) from the household survey also found similar conclusions that in the riverine flood prone areas people often rely on the formal/institutional type of early warning, but at the same time they also rely heavily on the indigenous type (Figure 4-6)of early warning. The findings also show that a large number a substantial amount (almost 30%) of the households also suggest that they actually do not rely on any kind of early warning at all. The formal/institutional type of early warning here refers to the official early warning that comes from any government authorized agency such as FFWC-BWDB in case of riverine flood.

Lead-time:

In terms of duration and lead-time of riverine flood, people talked about a lead-time of at least 5-10 days. Farmers and fishers identified that a 5-10-day lead-time would give them some opportunities to reduce their risk but for full safeguard of their crops and livelihoods they would require a lead time beyond 10 days. However, some farmers and fishers identified that a medium lead-time, approximately one month, would be needed to safeguard their agriculture and productions. At least a probabilistic indication (i.e. trend) of when the flood may approach could be of use for them to adjust their agricultural preparedness. The related responses are shown in the 4-8 figures on the lead time. The left figure suggests the existing lead time where people have a varied lead-time depending on their geographical location as well as access to the early warning information within the community where as the right below figure suggests the occupationally differentiated preferences of the lead-time for riverine flood.

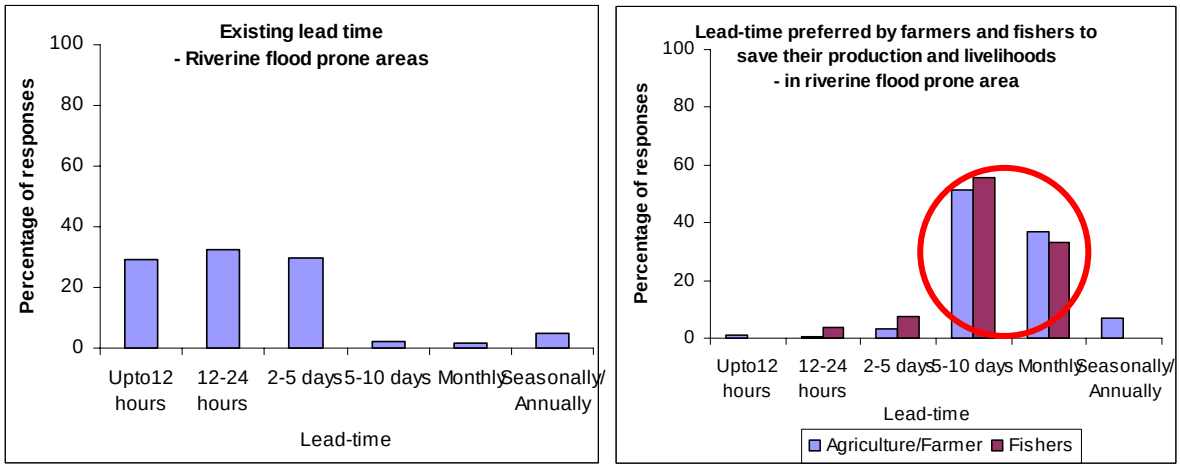


Figure 4-8. Existing and preferred lead-time for riverine flood related responses.

Type of EW information/messages received through formal/official means:

During the household survey, a question was asked related to the type of early warning information/messages they receive through the formal early warning. In this respect, it was found that several types of early warning information and messages reached the localities in a varied manner. Particularly, riverine flood related early warning information is disseminated primarily through the electronic media/news that is often broadcasted through national radio and television. Some flood early warning is also disseminated verbally from the local government, local agencies and particularly from the union parishad leaders (i.e. chairman and members). People often get some flood related risk indication through the seasonal outlooks. Figure 4-9 shows some more types of EW information.

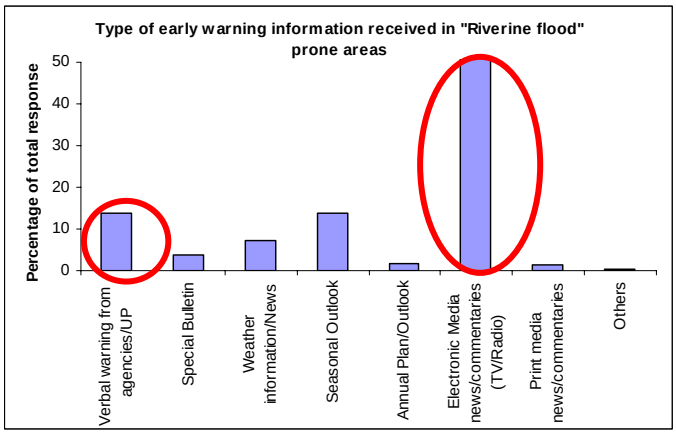


Figure 4-9. Type of EW information received in riverine flood prone areas.

Understanding of the early warning messages:

The household survey also tried to note the level of understanding of the early warning information that is received by the households from a formal source. The understanding level was categorized into four groups: no understanding, low understanding, medium understanding and high understanding. If any household did not have any understanding of the early warning messages they received in the past, then it was categorised as "no". "Low" understanding is referred to when a household receives the message and knows that a flood is coming but does not have any specific idea on when and on what level in their locality. The "medium" level was given when the household has an understanding of the tentative time of the flood arrival in their community. Finally, the "high" level of understanding was referred to when the household has a full understanding of the flood occurrence, its probabilities, as well as potential perceived impact on their community and households.

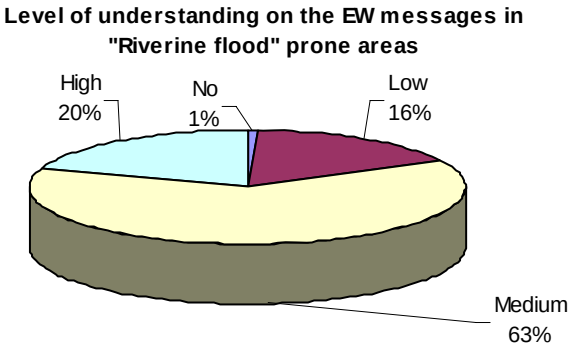


Figure 4-10. Understanding of the EW messages received in riverine flood prone areas.

The results show that in the riverine flood prone areas among all the households almost over 80% of the households (63% medium and 20% high) either have either a medium or high (63% and 20% respectively) level of understanding of the early warning messages that they receive. On the other hand, the proportion of households having low or absolutely no understanding is relatively low (Figure 4-10). The corresponding figure (figure 4-10) shows the detailed figures on understanding of the early warning messages by the households in the community.

Level of trust on the early warning in riverine flood prone areas:

The household survey and community focus group discussions tried to reveal more information on the level of trust on the existing early warning system in the riverine flood prone areas. In order to understand the level of trust of the households on early warning a six

class category was set based on a percentile scale. It was found that when a percentage (20% incremental) is put to the understanding level and discussed in combination with a number asking people to self-assess their level of trust people often find this useful. This allows the interviewee to have a relative comparison of the levels of trust and put a response accordingly.

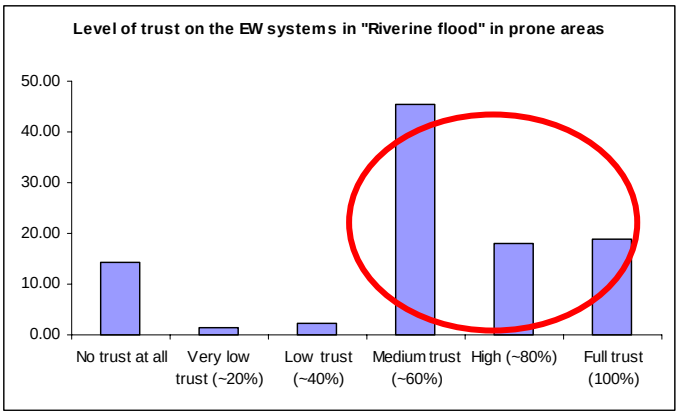


Figure 4-11. Responses on the level of trust on the EW system in riverine flood prone areas.

The results show that (figure 4-11) in the riverine flood prone areas most of the households have suggested that they have medium to high level of trust. The people near to the rivers of where they have more river water level gauges they have more accuracy of the information what they receive from FFWC-BWDB. In this respect, following the pattern the data from the riverine flood prone areas it can be concluded that the level of trust on the formal early warning in this area is relatively higher. However, a small proportion of households those who stay outside of the coverage of the river water gauge often suggested a bit different perspective.

Peoples' reactions to early warning:

Understanding of the actions people take after receiving the early warning is an important issue to be known. Both through household survey and community interactions the study tried to understand closely in which situation people tend to take actions in their households and communities. Considering this issue a gradual scale was presented to the community/households and asked to indicate a situation when their respective households take actions to the early warning. A gradual scale from bad to good situation (with six situations) were portrayed to the respondent and asked to indicate their households reaction points into a single one. The situations are (from worse to good): a) when some one dies in the community (due to respective hazard), b) when people observe some damage to their properties, c) when hazards (i.e. flood) arrives in the locality, d) In case of panic situation or when officials put enforcement, e) when EW information widespread among in community or others start acting, or f) whenever early warning information is heard.

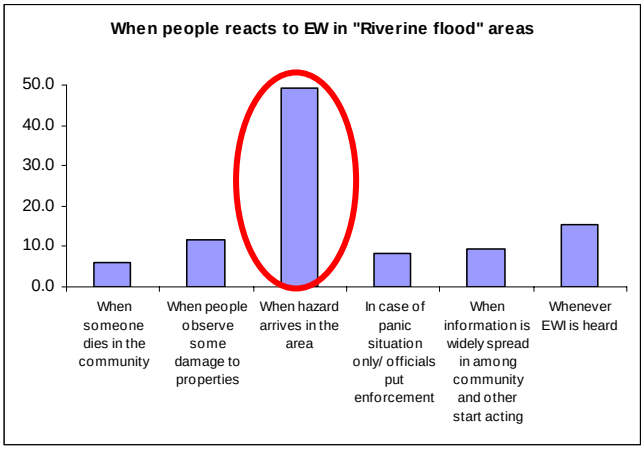


Figure 4-12. Responses on when people reacts to EW in riverine flood prone areas.

From the responses (figure 4-12) it emerges that most of the households tend to react when any hazard arrives in the area. This is actually a dilemma because although the early warning comes to the area in time but some people just tend to wait and see and do not want to respond to the EW immediately. The community level discussions also come up with similar kind of information and suggest that people often take more 'reactive-actions' at the ground level even though the early warning may already been reached to their respective locality. These indicates that in the riverine flood prone areas people often take a "wait and watch" kind of reactions. The community level findings suggested that this often probably due to people's movements and association with their assets. People often tend to live with their risks and assets at the same time because of the fear of loosing their last holding of assets (both of household assets as well as livelihoods assets).

Occupation specific EW issues, problems and suggestions for riverine flood:

During the CLIFMA study various occupational differences on early warning understandibility, dissemination, problems and suggestions emerged for riverine flood. Such issues and information for the major occupational groups are reported in the following table.

Table 4-3. Occupation-wise EW issues, problems and suggestions for riverine flood.

Lead-time	Early warning dissemination	Problems/barrier faced in existing EW system	Suggestions for improvement and sustainability
Farmers			
At present FFWC provides flood forecasting of 72 hours lead-time for selected river water levels which communities try to interpret for their respective communities. There are two sets of preferred lead-time sought further by the farmers for agriculture: a) a short term lead-time of 5-10 days, and	■ Understanding of EW messages: The flag hoisting method is understood and the information on the river water levels are often locally interpreted with varied success at community. Farmers get general idea about flood timing but do not get regular information about the duration and intensity. ■ Preferred mode of dissemination: Most preferred mode of dissemination is through local level miking/megaphone/siren, flag hoisting method, mosque miking, cell phone communication etc. ■ Preferred institutions: Greater involvement through UP, agricultural marketing	■ The lead-time at community/farm level is often relatively very short. Often farmers end up with few hours lead time only. This is in many cases are not enough for agricultural preparedness or to save either standing crops or farm assets/products. ■ Farmers do not get sufficient information on: a) duration of flood stay, b) local level flood heights/water level; c) when the water would recede from their area; and) what would be the volume of flood in their firm level. ■ Limited engagement of agricultural service	■ Local level institutional collaboration/coordination for EW is needed such as coordination between BWDB, DAE, Livestock Department, UP etc. should be enhance through active engagement of UDMC. ■ Local elites and people in communities need to be engaged on a repeated manner even in non emergency mode as well with clear mandate and responsibilities for agricultural preparedness. ■ Farmers sought EW information on: a) when the flood is coming; b) how long the flood would stay in their locality

Lead-time	Early warning dissemination	Problems/barrier faced in existing EW system	Suggestions for improvement and sustainability
b) 21-30 days lead-time for agricultural preparedness.	people, dealers, mosque, hat bazar committees, school teachers and health workers are sought.	providers in early warning dissemination or discussing seasonal outlooks at farm level. DAE officials often only engage in regular post fact operations or in regular extension works.	(duration) and c) what would be flood height. For rainfall flood farmers would like to know more information on the quantity of the rainfall in their respective area.
Fishers			
Fishers currently receiving a river level forecast of 72 hours from FFWC for selected rivers but for inland and other rivers the situation is quite different. The lead-time is often even less than one day and fishers often rely on their interpretations. Their preferred lead-time is at least 2-3 days at minimum.	■ Understanding of EW messages: The flag hoisting method is understood and the information on the river water levels are often locally interpreted with varied success at community. Fishers get general idea about flood timing but do not get regular information about the duration and intensity. ■ Preferred mode of dissemination: Most preferred mode of dissemination is through local level miking/megaphone/siren, flag hoisting method, mosque miking, cell phone communication etc. ■ Preferred institutions: Greater involvement through UP, fisheries department, dealers, mosque, hat bazar committees, school teachers and health workers are sought.	■ The lead-time at community/farm level is often relatively very short. Often fishers end up with few hours lead time for protecting their fish ponds (capture fisheries) or to shift their fish from pond to other locations. ■ Fishers do not get sufficient information on: a) duration of flood stay, b) local level flood heights/water level; c) when the water would recede from their area; and) what would be the volume of flood in their fishing ponds. ■ Limited engagement of fisheries department, entrepreneurs, service providers in early warning dissemination.	■ Local level water level further to the river water level is sought for fishers. Particularly, for the capture fishers this is often quite important as the river water level do not provide sufficient indicative for them. ■ Also the rainfall information is also sought for local level ■
Others (including wage labors, traders, businessmen, services etc.)			
■ Similar to farmers and fishers	■ Preferences are quite similar to the farmers and more dissemination is sought in the growth centers, market places and so forth.	■ Problems are quite similar to the farmers. For wage labors if they can have some indication of the flood time a month ahead then they can think of systematic migration. Similarly for businessmen they could protect their investment accordingly.	■ Suggestions are similar to the farmers.

4.2.2 Findings from "cyclone/storm surge" prone areas

Cyclone and storm surge early warning system is one of the more established systems in Bangladesh, particularly in the coastal part of the country where the vulnerability to the storm surge is relatively much higher. In the cyclone/storm surge prone areas people have a relatively higher level of acceptance and understanding of the early warning, but they would appreciate more accuracy in terms of area specification, intensity of the cyclone, and height of the surge in a timely manner. At this point, BMD along with CPP (in the coastal areas), and DMIC (from central level) with DMB are providing national level early warning information to the local systems.

Some of the new key types of problems were articulated on the cyclone/storm surge early warning issues.

- ***Confusions with the cyclone signaling system.*** People at the local level as well as some local institutional representatives still have confusions over the signalling system and administration of it. Particularly, the difference between maritime signal and the regular cyclone signal categories needs to be clearer. At the same time, it was suggested that when the signals are going up, a gradual increase from one category to another needs to be communicated with the community rather than a sudden jump. This has created problems of operation, evacuation and preparedness at the ground level.

- ***Livelihoods preparedness issues.*** Although the cyclone early warning provides a good lead time for the prompt evacuation of people to the safe sites (i.e. primary and secondary shelters), often this lead-time is not sufficient for saving the other types of resources such as field crops. It was pointed out that any necessary effective support in this regards is also not available at the ground level.

- ***Limited options after receiving the early warning.*** Another issue that was repeatedly discussed at the community level was the options available after receiving the cyclone early warning at the ground level. In the CPP supported areas there has been an information transmission and dissemination system after the warning from CPP volunteer groups. But after receiving the early warnings, even with a good lead-time, people often face very limited options of evacuation sites in some areas. In some areas, the capacity of cyclone shelters and other safe places are not high enough. At the same time, the capacity of the safe places for assets other than for human life is also limited and needs to be well connected with a better early warning system.

In the cyclone/storm surge prone areas it was also found that people often rely on the local understanding and depend on some indigenous methods of early warning. Both in community level and household level surveys it was identified that local people have dual reliance in many cases over formal/official and informal systems of early warning. Some of the local indigenous methods for cyclone/storm surge are as follows:

- People often observe the patterns of the cloud and wind movement, wind direction, cloud colour and its size/magnitude and tend to monitor it on a repeated basis;
- The level of sedimentation load on the sea water is also monitored by the community to try to sense the cyclone occurrence probabilities;
- Following the periodic lunar cycles has remained a long-standing practice as well;
- One of the more commonly believed practices is the observation of the animals and insects behaviours along with the changes in the sky (cloud and wind); and
- Some people have also talked about sensing the temperature of sea water in association with the wind/cloud observation and animal behaviour.

However, the household level findings suggest that among the formal/official and indigenous types of early warning, people rely more on the formal/official form of early warning. But a large number of people also tend to validate the formal/official early warnings along with the natural warnings through indigenous knowledge (Figure 4-13).

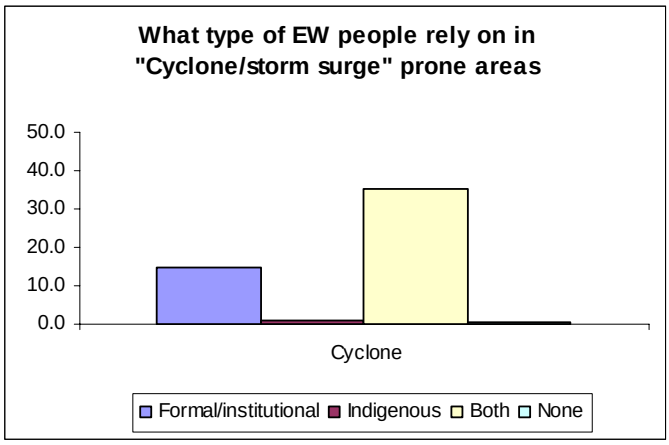


Figure 4-13. Type of EW people rely on at the HH and community levels in cyclone/storm surge prone areas.

Lead-time:

Representatives of the cyclone/storm surge affected communities have expressed that cyclone is a rapid onset hazard and the existing early warning lead-time should be increased. Although currently, in most of the cases the national level lead-time remains almost upto 72 hours but at household level it was found few hours only. The household level responses (figure 4-14) suggest that in most of the cases the household level lead-time is primarily upto 12 hours. The following figure on the left below shows that a major portion of the response have actually suggested that.

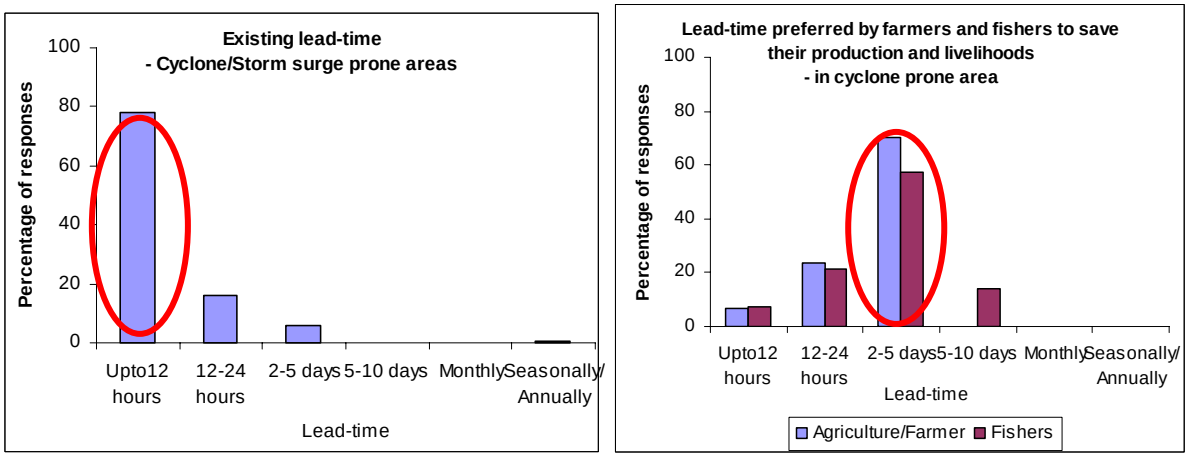


Figure 4-14. Existing and preferred lead-time for cyclone/storm surge EW.

However, the study findings also showed that a longer lead-time of 2 to 5 days at household level with a higher geographical accuracy is sought by people. In recent times, with the development of various Numerical Weather Prediction techniques this is possible on technical grounds.

People also want to know more information on the cyclone from its formation to the gradual development stage rather than just receiving the final warning on a blind manner. Educating community on these issues along with the warning systems is also a widely sought suggestion came from community level.

Type of EW information/messages received through formal/official means:

Both from the community level discussions and from the household level findings in emerged that people received primary through two major means to the community. Household survey data suggests that a proportion of almost over 70% of the households receive the early

warning information reaches primarily through from a combination verbal warnings (primarily through the CPP in coastal areas) and from UP in other areas and from the electronic media/news/commentaries that often broadcasted through national radio and television. The data is indicated in the following figure (Figure-4-15). These two modes remained as the most important vehicle of transmitting messages to the community in the critical period.

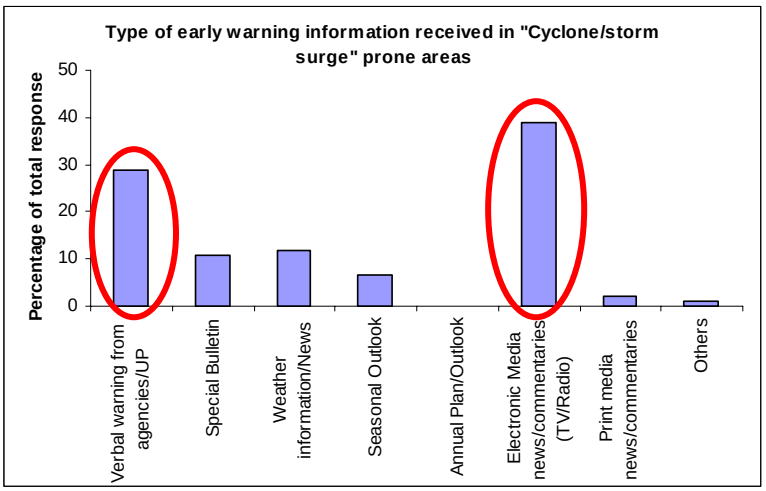


Figure 4-15. Type of EW information received in cyclone/storm surge prone areas.

Understanding of the early warning messages:

Data on the understanding of the early warning information/messages by the households are collected systematically. The meaning of the categories used for this purposes were explained earlier in this chapter. The results in of the cyclone/storm surge prone areas suggest that among all the households almost 85% of the households (51% medium and 32% high) either have a better understanding of the cyclone early warning messages being comprising of the " medium (51%) or and high (32%)" category from the questionnaires. The figure 4-16 shows that the level of "no" or "low" level of understanding of the cyclone early warning messages at household level is quite small in proportion (Figure 4-16). This has been a combined success of the BDRCS and CPP volunteers at the local level in the coastal zones.

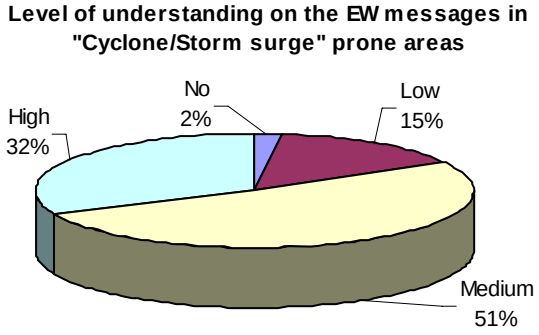


Figure 4-16. Understanding of the EW messages received in cyclone/storm surge prone areas.

Level of trust on the early warning:

The household survey and community focus group discussions have came up with some numeric data relating on the level of trust on the existing early warning system in the cyclone/storm surge prone areas. The results show that in the cyclone/storm surge prone almost a 90% of the households have suggested that they have medium to full level of trust on the official/formal early warning system. The figure 4-17 with this high proportion of

household responses it can be interpreted that the households have a very good level trust on the early warning information that they received in the past. This a very impressive issue and a major credit of it goes to the long running CPP program. The program through its community engagement (i.e. volunteerism) approach has made a significant effect on the level of trust and faith of the community towards the formal cyclone/storm surge early warning system.

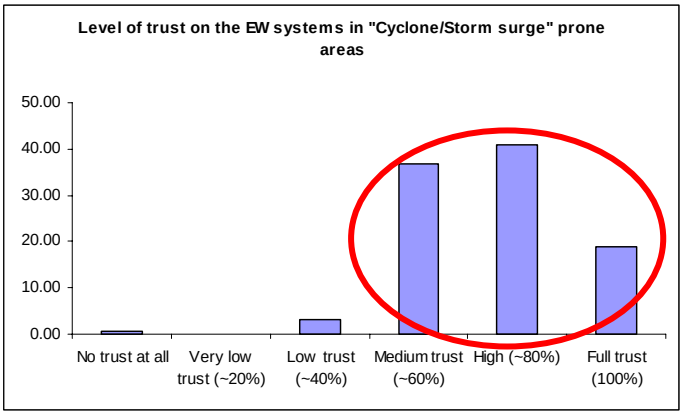


Figure 4-17. Responses on the level of trust on the EW system in cyclone/storm surge prone areas.

Peoples' reactions to early warning:

The responses on the people's end reaction after receiving the cyclone/storm surge early warning was found a bit different from the other hazards. Particularly, in the coastal areas it was found that people whenever hear the early warning from the formal sources or CPP, a big number of household consider immediate evacuation. However, the household survey data suggests that there has been another group of responses also take place besides the fast responding households.

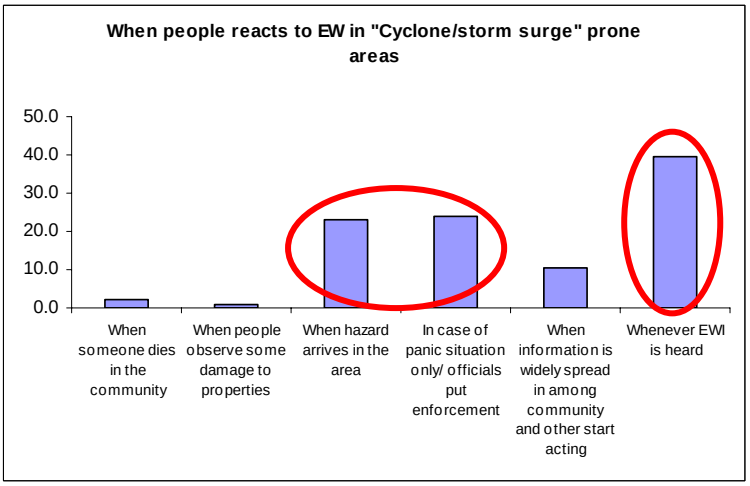


Figure 4-18. Responses on when people react to EW in cyclone/storm surge prone areas.

The household survey data (shown in the figure 4-18) showed that many households also tend to adopt a "wait and see" situation and evacuate in panic situation only or when any form of official enforcement comes for immediate evacuations (4-18). Farmers and wage labourers close association with their household assets often remain as a central issue for evacuations. For fishing households, deep sea fishing depends on financial support from the local fish businessmen and *dadon/mohazon* (middlemen) and their fear often works as major influencing factors in returning back to the mainland from a started fishing trip. Fishers often fear of loosing immediate assets and often respond only when the disaster is knocks the door.

These are some of the causes found behind household level late evacuations on cyclone early warning.

Occupation specific EW issues, problems and suggestions for riverine cyclone/storm surge:

Various occupational differences on early warning understandability, dissemination, problems and suggestions emerged for cyclone/storm surge areas. Such issues and information for the major occupational groups are reported in the following table.

Table 4-4. Occupation-wise EW issues, problems and suggestions for cyclone/storm surge.

Lead-time	Early warning dissemination	Problems/barrier faced in existing EW system	Suggestions for improvement and sustainability
Farmers			
At present farmers receive a lead time of 1-2 days but their preferred lead time is 5-6 days	■ Understanding of EW messages: Relatively higher level of understanding of the existing early warning is existing in the coastal areas ■ Preferred mode of dissemination: Most preferred mode of dissemination is through local level miking/megaphone communication/sirens, mosque miking, cell phone communication etc. ■ Preferred institutions: Greater involvement through BDRC/CPP volunteers, UP, agricultural marketing people, dealers, mosque, hat bazar committees, school teachers and health workers are sought.	■ The lead-time at community/farm level is often relatively quite shorter often farmers get only few hours lead time. This is in many cases are not enough for agricultural preparedness or to save either standing crop or farm assets/products. ■ In recent past the false/not impacted disaster early warning has also created some confusion at farm level. ■ Limited engagement of agricultural service providers in early warning dissemination or discussing seasonal outlooks at farm level. DAE officials often only engage in regular post fact operations or in regular extension works.	■ Local level community based early warning (e.g. BDRC/CPP initiative) activities can be strengthen further with revitalization of the local DM committees. ■ Local level institutional collaboration/coordination for EW is needed such as coordination between CPP, DAE, UP etc. should be engaged. ■ Local elites and people in communities need to be engaged on a repeated manner even in non emergency mode as well with clear mandate and responsibilities for agricultural preparedness.
Fishers			
Currently, fishers receives a lead time of 1-2 days but their preferred lead time is 5-6 days so that fishers can postpone or adjust their deep sea fishing trips.	■ Understanding of EW messages: Relatively higher level of understanding of the existing early warning is existing in the coastal fishers along with the maritime signals ■ Preferred mode of dissemination: Preferred dissemination mode for fishers are more on mobile devices such as radio, cell phone, VHF radio, wireless, light houses and so forth. This is particularly when they are on deep sea fishing. ■ Preferred institutions: They prefer to receive EW from radio, port authorities, fishing depots, fishing businessmen. Co-workers	■ In some cases fishers get EW after they start for deep sea fishing. This often comprehends them to get enough time or resource to return to the shore in time. ■ All the fishing vessels do not have VHF or other forms of radio communication to maintain regular emergency communication with the mainland. ■ Cell phone mobile networks are not available in the deep sea.	■ Fishing communities and fishing vessels should provide with the mobile network and remote communications for emergency period. ■ Ports and authorities may have agreement with the fishing depots or large fish businessmen for setting regulatory measures regarding fishing during warning period or issue specific instruction/measures for preparedness of the fishers. ■ Off-shore cell network can be extended.

Lead-time	Early warning dissemination	Problems/barrier faced in existing EW system	Suggestions for improvement and sustainability
	through wireless and mobile systems.		
Others (including wage labors, traders, businessmen, services etc.)			
▪ At present they receive a lead time of 1-2 days but their preferred lead time is 2-3 days	▪ Preferences are quite similar to the farmers and more dissemination is sought in the growth centers, market places and so forth.	▪ Problems are quite similar to the farmers.	▪ Suggestions are similar to the farmers.

4.2.3 Findings from "flash flood" prone areas

Flash flood has also been a major threat to the agriculture sector in Bangladesh. Particularly, the north-eastern six districts (usually known as Haor Basin) have remained largely vulnerable to flash flood in the early monsoon season. The flash flood particularly puts the boro crop under threat and becomes a critical issue. Haor Basin is just adjacent to the Indian (Meghalaya) hills and within a few days of rainfall can cause major flash floods in that area. Flash flood in the north-eastern Haor area submerges the embankments and dams to flood all the Haor every year, but the destruction usually occurs whenever it comes earlier to or during boro crop harvesting time.

BWDB in association with the other EW sources and research agencies such as BMD, IWM, CEGIS, ADPC try to provide some flood forecasts for flash flood in the north-eastern Haor Basin. However, any system with accuracy is yet to come. The geographical location and the complexities of the river system in this area often make it quite difficult to come up with a more precise early warning system.

At the community level, therefore, a low level of reliance on the formal or official early warning system exists. From the household survey data (Figure 4-19) a very small proportion of the households actually rely on the official flash flood early warning. Contrary, a relatively large number of households were found have reliance over the indigenous type of early warnings. A significant proportion of the households also cannot rely on any kind of early warning due to the quality of forecasting as well as criticality of the situation. In these cases people tend to take local level preparations for protecting their embankments and infrastructures to delay the entrance of the water flow from river to inside the Haors where most of the crops remain standing on the field.

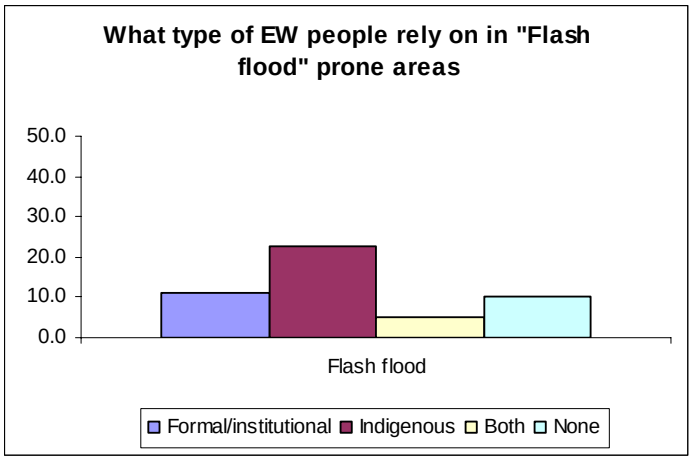


Figure 4-19. Type of EW people rely on at household and community levels in flash flood prone areas.

Some of the indigenous type of early warning practiced in the flash flood prone areas are observation of the torrential rainfall upstream in India/Megalaya hills, sudden increase of water flow in the river, sediment level in the river water, wind patterns and so forth. However, the efficiency of these methods are often found quite low in the Haor Basin, and as the geographical and climatic situations are changing, some of these local methods are also facing huge challenges to retain any efficiency themselves.

Type of EW information/messages received:

In the flash flood area, people suggested (see figure 4-20) that they do not receive any formal/official type of early warning system for flash flood but often follow the electronic news and commentaries through TV and Radio from the upland India and also from the Bangladeshi media news. However, these are very recent patterns. The following figure from the household survey clearly supports this statement and indicates that for flash flood prone areas only the above discussed electronic media remains as only early warning information which they receive on an event and ad hoc basis.

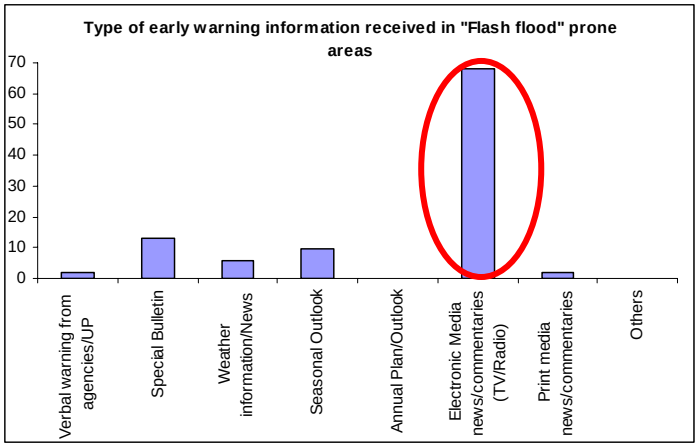


Figure 4-20. Type of EW information received in flash flood prone areas.

4.2.4 Findings from "drought" prone areas

Drought has been a silent hazard in the country. The findings from the drought prone areas suggest that at this point no major early warning system is available for drought on a wider scale. Since the last few years some studies and developments have been underway to pilot test some drought models. DRAS model piloted by SRDI, BRRI, BARI and CEGIS has been one model which has been under development and testing but has not been implemented. However, particularly in the north western part of Bangladesh, some drought early warning information has started to be shared on a developmental basis considering consecutive non-rainy days. At this point, DAE block level professional try to share the Agro Ecological Zone (AEZ) maps that are produced by SRDI for field applications. In the north western districts Barind Multipurpose Development Authority (BMDA) has started to take some actions to make the communities aware of the drought situation along with DAE on a seasonal basis.

The data from household and community levels suggest that in the drought prone areas, people are more receiving information in the form of seasonal outlook and very general form advisories through the electronic media and news. The following figure 4-21 and community FGD finding suggests the similar conclusions.

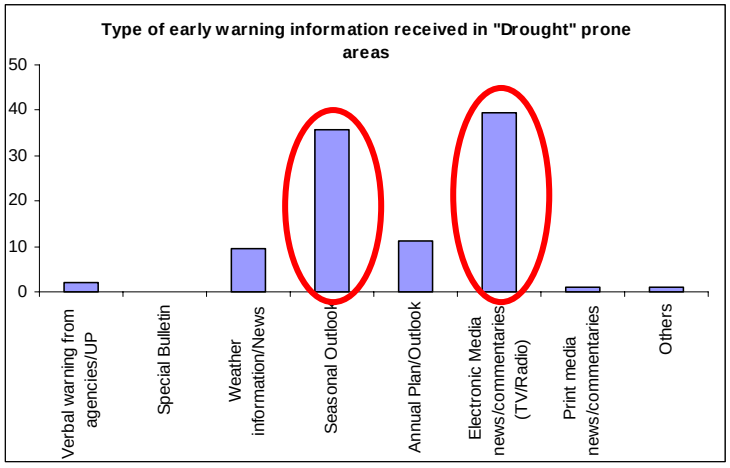


Figure 4-21. Type of EW information received in drought prone areas.

The household level responses suggested that the existing lead-time at farm level for the drought is primarily on an annual basis and the DAE extension services and other departmental sources provide yearly information about the drought situation broadly for the area. However, the household level responses (see the figure 4-22 right one) suggest that the preferred lead-time for the drought mitigation is monthly. This is particularly suggested by the farmers in the drought prone areas.

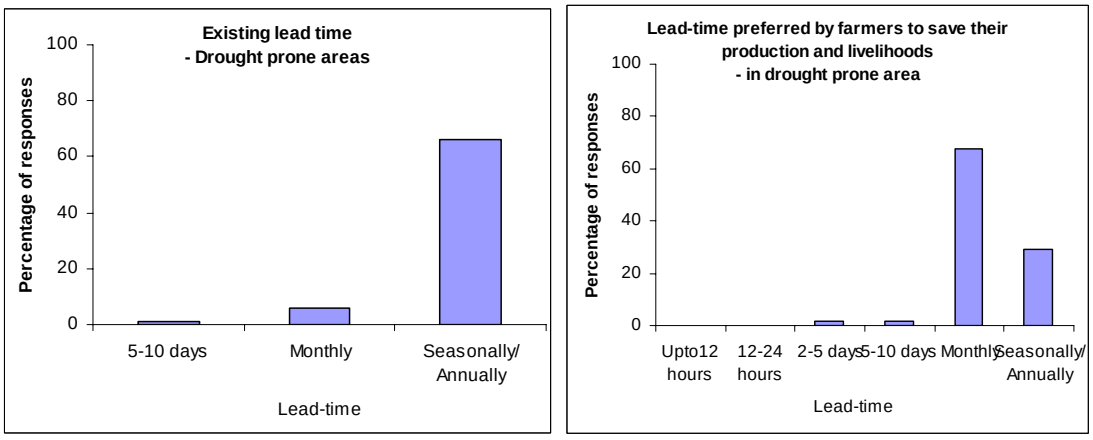


Figure 4-22. Existing and preferred lead-time for drought.

4.2.5 Findings from "riverbank erosion" prone areas

Riverbank erosion has been a regular phenomenon in the riverine parts of the country. On the Brahmaputra-Jamuna-Ganges as well as on the Padma-Meghna River riverbank erosion has been an onset of often sudden and often characterized as a slow eroding nature. However, over the past few years, BWDB with CEGIS and others have developed a hydro morphological model for predicting riverbank erosion. This initiative has for the past few years received national acceptance as well as started to grow towards community level dissemination of the early warning products at the ground level.

The household and community level data from the riverbank erosion prone areas suggest that people in the pilot areas have now started to see some results of the piloting of the erosion prediction methods at the community level. Usually people in communities tend to use their local knowledge and wisdoms for understanding the behaviour of the river and river water flow and take some decisions. However, in most of the cases it was found that people often take a "wait and watch" approach until even the last moment when the bank erodes.

At present, the new erosion prediction method provides a prediction of the next year's pattern of erosion and primarily through a local map indicates the potentially vulnerable areas and how long of the bank can be eroded during each flood period and beyond. It was found that whenever the project has piloted and been into an active interaction of the community, the people gained more trust on the method.

4.2.6 Findings from "landslide" prone areas

During the household survey and also in the community level interactions, it emerged clearly that many people do not consider landslide as an immediate hazard. People living in the landslide prone areas often give priority to their regular livelihood issues and problems and do not consider landslide as a major threat until they face it.

At the community level people are hardly aware of this hazard. However, those who know or had previous experiences with landslide suggested that there isn't any EW received at the community level from any formal institution, but in past few years when there was any excessive rain in the locality people often heard of the potential risk from several sources such as electronic news media, mosque Imam, local discussions and so forth. People, however, understand that whenever heavy rainfall occurs in the community, the chances increases for any potential landslide.

4.2.7 Findings from "tsunami" prone areas

Tsunami has been an unknown phenomenon until the December 2004 Indian Ocean tsunami has hit the region badly. People in Bangladesh have always been exposed to cyclones/storm surges but there are no memories of any destructive tsunami in the country. Communities of the coastal zone of Bangladesh were found to be not familiar with the hazard itself.

During the community FGDs as well as in the households, it was pointed out that people in the communities have a multifaceted understanding of tsunami. Some suggested that tsunami might be a big new hazard in the coastal area; comparing its severity and intensity, tsunami would be bigger than cyclone. Some people seem to know that tsunami is generated from an earthquake at the ocean bottom, but how it travels is not often clear to them. A more popular terminology of tsunami in the community is this is: "tsunami is like a big flood and comes with a massive tidal surge" pointed out several people from the study communities.

People suggested that in the study area, a tsunami warning was experienced once but not any tsunami hazard was faced. With an issued warning on 12 September 2007, many people actually evacuated with from their experiences of cyclone/storm surge occurrences in the past. People have primarily followed the warning and evacuation procedures of cyclone in their respective areas and similar facilitating institutions such as CPP and others facilitated the process.

4.3 Some general findings and cross cutting issues

4.3.1 People's understanding of EW and various influencing factors

A varied level of understanding was found among the households on the early warning messages that are disseminated at community and household level. Various factors are looked at to understand a pattern of these varied understanding.

It was found that the people's understanding of the early warning differs among the people with varied level of literacy. From the dataset a classification of literate (those who can read and white) and illiterate (those who cannot read or white) are made and their response on early warning understanding were calculated. The survey figures (figure 4-23) suggest that in most of the cases when the education level increases the understanding level of the early warning remains higher. On the other hand, those who responded to have "low understanding" of the early warning messages, are primarily illiterate or having literacy below high school education. This finding clearly indicates that education has a clear influence on the level of understanding of the early warning information for most of the hazards.

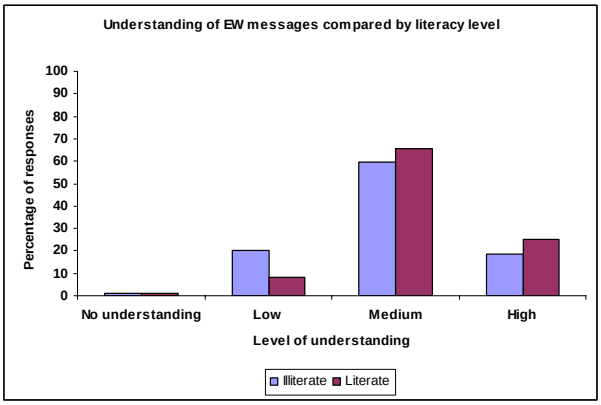


Figure 4-23. Understanding of EW messages compared among literate and illiterate members.

Table 4-5. Early Warning Understanding level is compared with various indicators.

Indicators	Category	Proportion having low understanding
Annual household Income	Annual income<25000	18.03
	Annual income >25000	13.53
Occupation-wise differences	Dependent/others	25.23
	Fishers	17.24
	Wage labor	12.96
	Agriculture/Farmers	11.06
	Trading/Business/Services	4.69

Similarly, the above table (Table4-5) provides a comparative dataset of responses of people having "low understanding" and their income and occupational categories. This data also suggest that higher the household income level greater the level of understanding. To explain this figure, it can be suggested that those households have an annual income less than 25,000 taka (we can say having income less than dollar a day) have responded most for the low understanding of the early warning. These groups of people often have difficulties in understanding of the early warning immediately in their households.

When we see the figures on the occupational differences we find that dependent people (children, elderly etc.) have the most responses on the "low understanding". Fishers and

wage labourers are the next group who has low understanding of the early warning messages in the community. However, it was found that farmers have a relatively higher level on understanding comparing the other three groups while the more educated groups involved with trading/business or services have the higher level of understanding of the formal early warning messages.

4.3.2 Early warning information sharing

The household survey has tried to look into the pattern of EW information sharing in the study communities in general. From the data it was found that in most of the rural areas people do try to share the EW messages/information when they receive within their households. From the general response of the households it emerged as well. However, this might be due to both purposes: either for validation purposes or may be done for information sharing purposes. The following data (4-24) from the household suggests that almost 55% of the times households share EW information with other when they receive that.

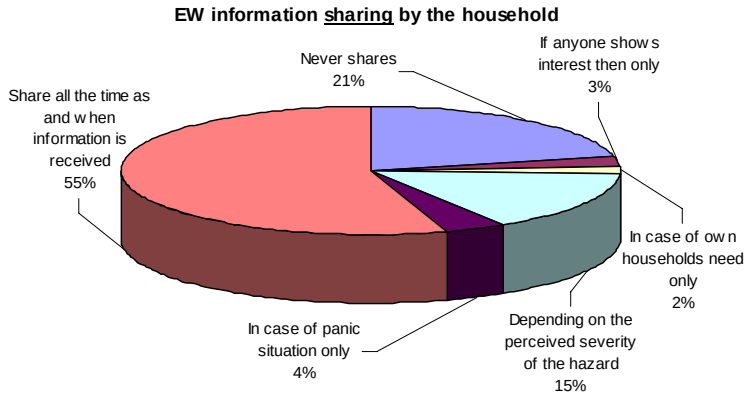


Figure 4-24. EW information sharing by the households.

4.3.3 Existing and preferred mode of EW at community

In the survey questions were asked on the existing and preferred mode or media or relay source of EW information. It was found that people in the household identified that in the existing situation, people are receiving EW information from Radio, TV, and also orally from relatives and others in the community. However, in suggesting for the preferred media people suggested that the local government/UP should now come into play and take a major responsibility for sharing the EW information to the community. People also suggested further that UP and UDMC should be strengthened institutionally for EW purposes as well and capacity on EW information and systems should be built in this line. The data reflected from the figure 4-25 and from community level FGDs.

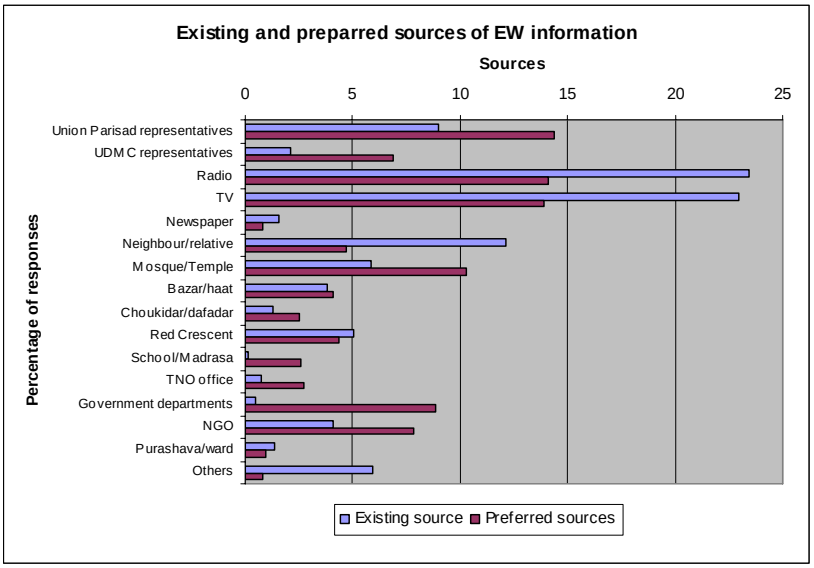


Figure 4-25. Comparison of the existing and preferred sources of EW information.

4.3.4 Households' access to various types of communication technology

Household's access to various types of communication technology increases the chance of receiving EW information from redundant sources. People have more access to the TV, Radio, microphones/mikes, and cellular phones compared to the land phone or wireless in their communities. These are the media people have been quite acquainted with in the past decades as well. Also, the widespread expansion of satellite TV and in particular the Bangla news channels over last decade or so has started to make some impact on the rural areas itself. Similarly, the widespread coverage of cellular phones in recent times has remained a major new factor to the communication technology innovation in Bangladesh.

However, in general as the level of education is quite low still at the community and household level, a reliance and preference on visual and oral modes are predominant. This reflects to the age old oral traditions/culture of the Bengali community itself as well.

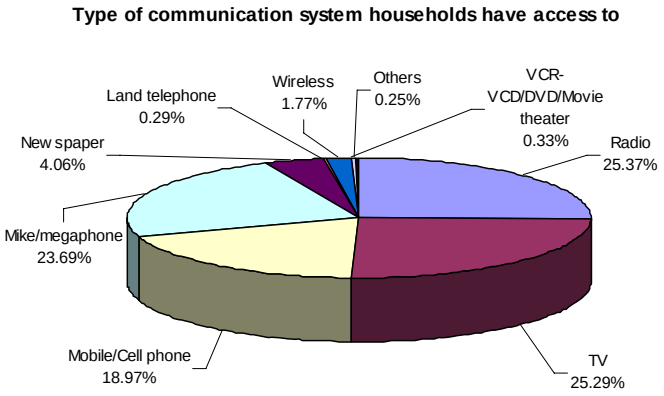


Figure 4-26. Type of communication system HHs have access to.

The households have also reported their responses on their preferred type of institutions for early warning dissemination in the community. Various types of institutions are grouped into three broad types: a) government and local government institutions; b) NGOs and civil societies, c) Media.

Household responses suggest that farmers and those who are associated with the agriculture are preferred mostly the government and local government institutional sources as the most preferred entity for disseminating early warning. The following data in the figure suggest that this situation is also common among the fishers as well. However, for fishers it was found that fishers are also dependent on the national and local media for their early warning information and signals. Many fishing boats have radios in their fishing boats. A comparison can be seen from the following figure.

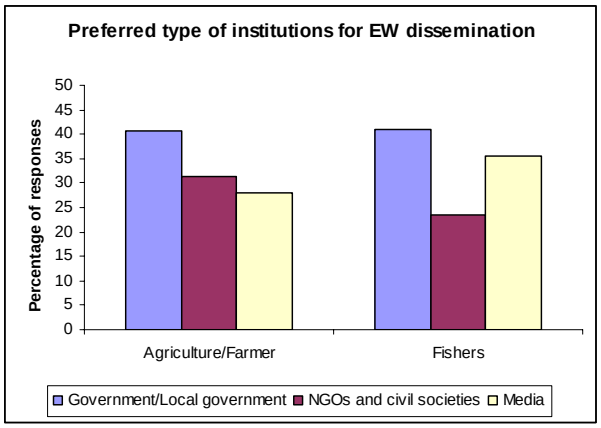


Figure 4-27. Preferred type of institutions for EW dissemination suggested by farmers and fishers.

4.3.5 Household's willingness to pay for EW services

Households were asked to provide their comments on their willingness to pay for the EW services. The reply was quite diverse as shown in Figure 4-28. Almost 20% of the cases households are not willing to pay for any EW services, a large number believe that (33%) government should pay, and about 26% are willing to pay jointly with government. The detailed responses are shown in the figure below.

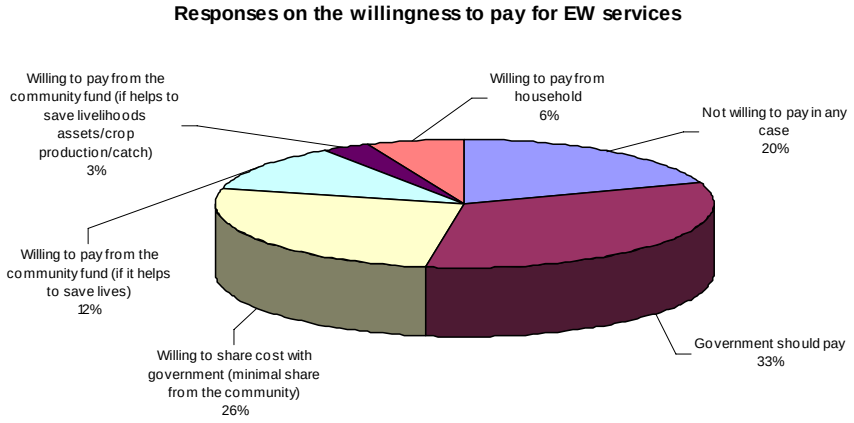


Figure 4-28. Responses on the willingness to pay for EW services.

4.3.6 Capacity and service factors:

On the capacity related questions asked to the households, it was found that unavailability of the warning dissemination equipment, lack of local institutions for regular warning, lack of human resources and other capacity related factors are the major ones for establishing the

local level capacity issues (Figure4-29). The figure 4-29 details out the proportions of the respective type of capacity factors.

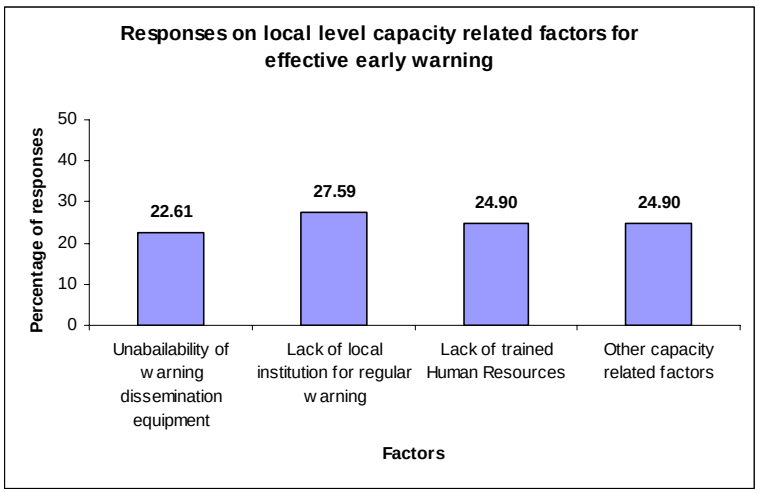


Figure 4-29. Local level capacity for effective EW.

The community level FGD responses showed that in most of the cases people lack skills and skilled manpower for establishing community level EW in their respective communities. The lack of EW information receiving instruments, infrastructure and financial constrains are among the pressing propositions for effective receival, transmission and dissemination of EW at the community level. Institutional capacity at the community level is also very weak. UDMCs in many cases are either non-functional or not formed effectively. Strengthening of this institutional entity is recommended by the community in an important way.

Chapter 5. CLIFMA findings: Institutional responses

The CLIFMA field study, besides the household level surveys and community focus group discussions, has particularly designed a layer of qualitative interaction on the institutional issues through the methodological modality of institutional focus group discussions (IFGD). IFGDs are particularly focused on the early warning and overall institutional issues and discussed with the institutional or official level stakeholders of respective upazilas of the study. Usually, after completion of the community and household level field work, the IFGDs are carried out in Upazilla Nirbahi Officer (UNO) offices in the respective study areas. In such IFGDs, the upazila level administration, the line agency/departmental representatives, NGOs operating in the respective area, local representatives and others participated and provided their observations and comments.

In this chapter, based on these IFGD findings, the respective institutional responses and issues raised are discussed by hazards in a sequential way. The recommendations articulated in these IFGDs are also outlined by hazard in the corresponding sections. The roles of local level Institutions, performances of these agencies in EW, operational linkages and various suggestions for improvements that came out of the discussions are also reported in a tabular format at the end of the chapter (Table 5-1).

However, before entering into the local level institutional setup and the discussion, an outline of the existing EW institutional linkages for EW and their gaps are discussed briefly in the following section.

5.1 Existing EW institutional linkages and gaps

Sources of information for disaster management vary on the basis of respective nature of hazards. Different organizations deal with different hazards. From the analysis of the early warning institutional setup, it was found that institutional entities are engaged both at vertical layers as well as horizontal scales. This horizontal and vertical setup of existing hazard based early warning systems in the country can be clearly portrayed in the Figure 5-1. The diagram shows that the three different cross sections of formal institutions, operational entities and voluntary entities in a sequential manner.

Central/national level

In the vertical formation there are various layers of agencies which are involved with the early warning system. At the top The two main source agencies are Bangladesh Metrological Department (BMD), and FFWC of BWDB. At the national level BMD generates information on cyclone warning. FFWC at the national level also provides flood related risk information. FFWC also receives some information on specific parameters from BMD and SPARRSO. FFWC at the national level is responsible for all different kinds of floods in Bangladesh such as riverine flood, flash flood in the northern part of Bangladesh, tidal flood in coastal areas and also for urban floods in the cities and secondary cities. However, effective systems for all kind of flood forecasting are yet to be developed at an advanced level while riverine flood system has been developed to a good level. Other national research institutes are also helping government such as IWM, BARC, CEGIS, and SPARRSO. This set of agencies that are operating primarily from the central level are often identified as the *"central/national level agencies"*.

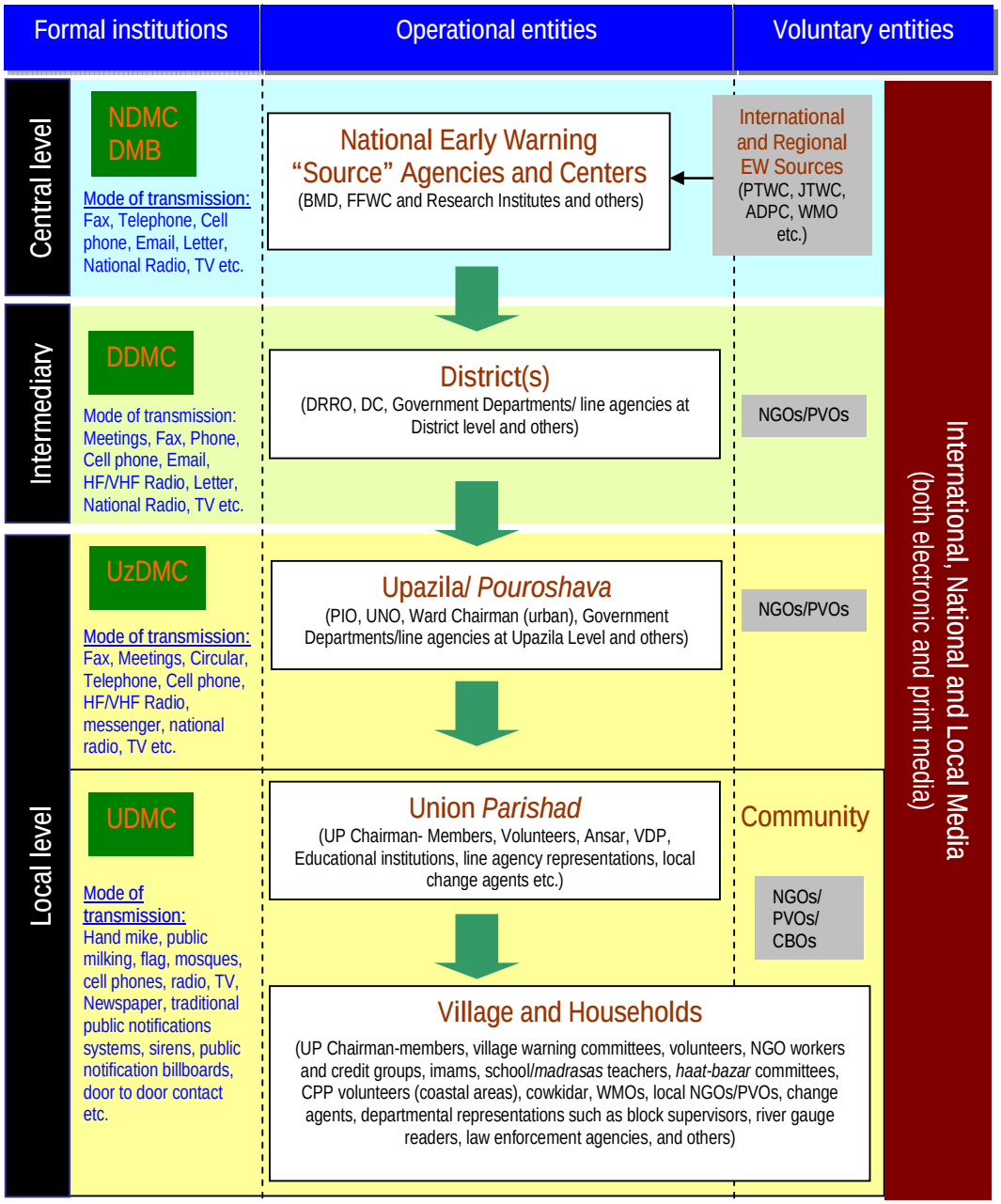


Figure 5-1. Various level of agencies observed in the link between source and destination (Source: ADPC: Oct, 2008).

International and regional sources

However, some *International and regional sources* are also contributing such as the Asian Disaster Preparedness Center, JMA, SMRC, Indian Meteorological Department, Nepal Hydrology Department, China Bureau of Hydrology, NOAA, Pacific Tsunami Warning Center, JTWC, and TSR. These are also contributing through central level agencies but are actually regional information providers.

Intermediary level

In early warning dissemination and forecasting, the *intermediary level* also plays a significant role in relaying the information down to the local level. In between source and community, there are many organizations, both government and non-government, which use the information for disaster management based on their mandates or voluntary basis. The district level can be identified as the intermediary level entity in the overall early warning system information flow route in Bangladesh.

Local level

The ultimate destination of information in the Disaster Management Information Network is the vulnerable community or end users. The early warning information goes from the intermediary level to the local level. It was observed that at operation and also at a voluntary level upazila, union and community levels, including the villages and households, together comprise the *local level.*

It was found that although the overall links are there for dissemination of early warning information down to the ground level, there are several layers of gaps existing in the practical setting. These gaps create information communication delay, lack of action, ambiguity of the prioritization of action, and confusion and isolation of the households.

At the household level, various culturally suitable and effective modalities of risk communication and information dissemination is missing. In some cases, the technological lags are there, but in many cases although there are some modalities and communication technology such as cellular phones and loud speakers, these are never involved systematically or endowed for risk communication prior the event.

However, wherever some projects or initiatives were undertaken, some sort of mobilization and awareness towards risk communication is there. Particularly, the coastal areas are a good example of cyclone early warning system which is evident through the CPP and BDRCS volunteers at the ground level. A conscious attempt should be taken centrally to identify the better practices and innovative identification of hazard specific community early warning systems in a gradual manner. Under the DMIN initiative, some of these improved practices can be further acknowledged and piloted for further efficiency.

At the local and community levels, although there are some good examples existing, the sustainability of these methods for local disaster information sharing methods are under stark challenge both on financial and technical grounds. Some of the recommendations that emerged from the field discussions are reported in the recommendation section of this report. Sustainability of the disaster management information networks and technologies below the upazila level is a major challenge, and in this challenge well concerted action and planning is needed combining the efforts of government agencies, NGOs on the ground, civil society entities, local government and the community level change agents. Setting up an adequate institutional framework for such and initiative is also an essential step to consider.

5.2 Findings from riverine flood and erosion prone areas

Early warning accessibility and receptivity:

During the IFGDs at the upazila level, it emerged that there is a formal means of communication system available in the government system for warning dissemination, but due to excessive tiers and the administrative process it often takes longer to access the real time forecast information by the local institutions. For example, in several cases, flood warning may reach the upazila level when flood water has already entered into the respective area. The Upazilla Nirbahi Officer (UNO) and other GOs and NGOs sometimes collect water level information from nearby BWDB offices and through FFWC websites and disseminate to the UP Chairman and upazila level offices for better preparedness.

The Project Implementation Officer (PIO) under the UNO is responsible for receiving and disseminating the warning information from districts. The current capacity at this level is very low compared to the needs and not adequate to support appropriately. There is a lack of necessary human resources, appropriate training, and logistics (i.e. computer operator,

internet facilities, fax, etc) to accomplish such activities. Access to the people living in remote chars is quite difficult and may not be possible except for a door to door visit. Hence, someone has to physically visit the endangered community to inform them of the EW information. UNO, UP Chairman, UP members and local volunteers do not have the budget or provisions for water vessels or financial support for such arrangements. Thus, they cannot even utilize those services to disseminate EW.

Institutional preferences:

Institutional preferences for the source to receive EW information of riverine flood and river bank erosion vary by the different users, stakeholders and by respective nature of the areas as well. Some local institutions of prefer updated information through websites (also direct communication/letters) of FFWC, DMIC, CDMP, MoFDM, and DMB some from other areas often prefer direct SMS, cellular phone, land telephone and fax from the national level sources. Most of the agencies have also requested parallel notification from the concerned authorities and local level BWDB offices for flood and erosion.

Preferred warning communication and dissemination mode:

The existing EW dissemination system is not able to reach the end users and may cut off before its proper application. The participants prefer multiple means of communication such as web-based EW, phone from local the level Water Development Board, fax, email, SMS and others. SMS over cellular phone could be very useful for dissemination of information to union and community levels. Additionally, EW information dissemination would be very effective through microphones from mosques by the Imam. EW information directly from source agencies to the local institutions would be more effective to save time. Direct SMS/phone to UP Chairman from BWDB/DC while they are sending SMS/phone to UNO could provide them enough lead time for preparation. A direct communication between the BWDB/ BMD to upazila or union levels with adequate funds and logistics is required.

Understanding the message:

Regarding the understanding of the EW message, all the responsible persons of the institutions understand EW message very well. Hence they want to know only the water level information of the major river to disseminate early warning messages towards the union and community levels.

Lead time:

Participants at the IFGDs in different locations agreed that 10-15 days lead time is essential for riverine flood to respond effectively. Besides this, if the lead time of the river bank erosion is less than about 2-3 months, it would be better to have organized responses particularly for the agriculture sector.

Recommendations from the IFGDs to improve EW information flow from upazila to the community:

- Regular updates and availability of the websites of the FFWC, BMD, DMIC, CDMP, DMB, BWDB, MoFDM and MoWR to access information and take necessary actions;
- Because of trans-boundary water flow, north-central districts are affected before the central districts of Bangladesh So trans-boundary water flow and rainfall information should be analyzed by warning institutions (i.e. BMD. FFWC. SPARSO, etc) and informed directly to the Deputy Commissioner and UNO of the north-central districts;
- Government should take initiatives of a social mobilization programme, awareness and capacity building and training activities in the community and for local institutions for effective response;

- Ensure activation and coordination among the institutions/committees (UzDMC, UDMC, Ward committee and NGOs) and every member of each committee should be accountable to its authority;
- Adequate flood shelters and security need to be ensured at the household level for effective community response;
- Increase skilled manpower at upazila and union levels and provide logistics (i.e. microphone, rickshaw/van, speed/engine boat, cellular phone, budget allocation, and more IT facilities and maintenance cost to support EW related activities);
- Increase participation of *imam/hat bazaar* committee for disseminating EW information at the village level;
- Disaster Information Centre (DIC) needs to be established at the union level to strengthen UDMC with appropriately trained personnel (i.e. 4-5), equipment (cellular phone phone, TV/radio, microphone, etc) with existing UP offices being used for this purpose and a direct communication mechanism established among FFWC, DMIC, CDMP, DMB, BWDB and the union DIC;
- The areas which are usually not covering by any specific hazards those areas needs to avoid while disseminating EW or can inform but not for dissemination;
- Video screening on different past severe disasters can be arranged at markets or villages for an effective response from the community and increased awareness of the people;
- Easy access to get EW information from websites and mobile SMS in Bangla and English; and
- Early earning message can translate into local dialects to make them easily understandable to the mass community, volunteers and stakeholders in all aspects of disaster management.

5.3 Responses from drought prone areas

EW accessibility:

In practically, there is no such well established EW for drought or drought information system available in the country. Farmers in the drought prone areas often proceed with their farming arrangements without having any outlook of the drought in their respective areas, thereby failing to get adequate crop yield, often exposed to terminal drought and shortage of agricultural preparedness in time. At the present situation, at the ground level the Department of Agriculture Extension (DAE) at the block level provides some advisory support through crop calendar and delineation of agro-ecological zones, but does not provide any detailed information for either the terminal droughts or even any clear early warning for the drought situation in the area. Nationally, there are some upcoming initiatives by several research agencies such as SRDI, BRRI, BARI and BWDB (e.g. DRAS model) but these are still at the piloting/development stage.

Institutional capacity:

There is no institution at the local level to receive and disseminate EW information of drought to the community. However, the Department of Agriculture Extension (DAE) is creating awareness on impacts of drought which is not related to EW. An institutional set up is necessary for drought forecasting in the north-western part of the country.

Preferences:

The north-western part of Bangladesh is mostly prone to drought where agriculture is highly vulnerable. The farmers and community in this location want to have some early warning information on drought. The Barendra Multipurpose Development Authority (BMDA) plays a significant role in this drought prone north-west region of the country to continue cultivation

of agriculture by facilitating irrigation, but does not disseminate EW messages. The participants recommended that along with the BMDA role in drought prone areas, EW messages are very essential for minimizing the loss of crop production and livelihood options. An early warning information provision from BMD and DAE to upazila and parallel BMDA authority has recommended. Participants also mentioned that BMDA is sufficient enough to disseminate EW with the coordination of UNO and DAE upazila office on drought as they have a huge integrated network of professionals at the farmer level and everyone relies on them.

Recommendations to improve EW information flow from upazila to community levels:

- A well defined EW for drought is to be devised;
- Concerned government departments' professionals, BWDA, BMDA, DAE and NGOs are to made aware of such an EW;
- Minimum 2 month lead time is required in case of drought EW;
- Development of IT facilities at upazila and union levels for drought relevant information;
- Easy access of drought EW information from websites by BMD and others;
- Awareness building among communities on drought forecasting;
- Direct information dissemination to upazilla and union levels from BMD;
- BMDA can play a significant role to disseminate EW to the farmers and the communities; and
- Involvement of local NGOs as they are very active in these drought prone areas for agricultural production and relevant activities.

5.4 Responses from cyclone and tsunami risk areas

EW accessibility and receptivity:

Institutional FGDs in cyclone prone areas revealed that there is an EW system which they receive prior to a cyclone, though there are many constrains at the UDMCs level with UDMCs found in some cases inactive. Community people were not aware of the existence of UDMC and of their roles and responsibilities. Hence, measures have to be taken to make UDMC more active and visible in the community. The existing level of coordination among government institutions and NGOs working in the cyclone prone areas is not conducive to maximize safety of lives and resources.

Representation of Cyclone Preparedness Program (CPP) at upazila to community levels is not strong enough to handle the EW dissemination process at critical times. CPP volunteers are not provided with enough logistics and financial support. Again the volunteers are not updated with training after they are first recruited and trained. In addition to that, other local government institutions working in the area do not coordinate with them and CPP volunteers are not fully utilized by the local administrations (i.e. relief and rehabilitation).

Preferred lead time:

Cyclone is one of the rapid onset hazards, and similarly tsunami is a more rapid hazard on aspects of all types of hazard. The participants urged for 4 to 5 days or more lead time for cyclone preparedness and response effectively. For tsunami, there will not be adequate time available for a distant tsunami, but a lead time of 10 to 12 hours would be sufficient to evacuate at-risk costal populations of the country.

Recommendations to improve EW information flow from upazila to community levels:

- A permanent responsible person needs to be appointed to manage the institutional activities on early warning information and overall disaster management at the upazila level;
- Ensure activation and coordination among the institutions/committees (UzDMC, UDMC, Ward committee, CPP and NGOs) and every member of each committee should be accountable to their authorities;
- Governments should provide necessary equipment (i.e. megaphone, microphone, rickshaw/van and adequate funds) to UzDMC, UDMC, ward committee, CPP and NGOs along with training, rally, and honorariums, and refresher programmes for motivation and knowledge update;
- UP council can be made as a local UEWIC where communities can get all EW and related information, the centre will be equipped with megaphone, microphone and van;
- Incentives in the form of honorariums at least for the hazard season and training can be arranged for the volunteers;
- Miking with a van in rural areas and simultaneous SMS with EW information to remote areas would improve the EW dissemination system;
- EW information can be disseminated through group SMS to the community from the CPP and/or upazila office;
- Awareness levels of the community must be enhanced through providing different awareness, preparedness, training and social mobilization programmes, and meetings/seminars/workshops/presentations/rallies can be arranged once or more times each year within the communities, government and nongovernmental officers, staff and volunteers to refresh, motivate and encourage them;
- The NGOs who have micro credit programmes and field workers can be engaged with the EW information dissemination activities; and
- Besides the existing system, EW and other relevant information on disaster can be disseminated through websites to make the EW system easy and faster.

5.5 Responses from landslide prone areas

EW accessibility:

According to the participants of the hilly region institutions, landslides occur there due to heavy rainfall. Furthermore, they believe that landslide is really a manmade hazard and few landless people cut at the bottom of the hill and habitats illegally. There is no formal EW system for landslide in the hilly area of Bangladesh, but during heavy rainfall there is dissemination of early warning on rainfall to informally inform people to leave the area at the bottom of the hill. In spite of the dissemination of the EW there is no response from the community. Local administration takes few initiatives to evacuate the community who live illegally but there is no result at all.

Preferred warning communication and dissemination mode:

Landslide is not a natural hazard for the hilly region of Bangladesh but it's a manmade hazard. So govt. should take initiatives to rehabilitate or enforce the population who live illegally bottom of the hill. They like to get EW from BMD about flash flood which may forecasted by BMD from the collected meteorological data of India and Nepal. They also want to early warning information on flash flood from FFWC, CDMP, DMIC and local Water Development Board by keeping update website, wireless, fax and phone.

Preferred lead time:

According to the institutional discussions it seems that landslide is intricately influenced by flash flood; hence, EW on flash flood can help aware people of landslide. They want real and just information from BMD about heavy rainfall within 3-4 days so they can enforce and rehabilitate the community. EW information is not so effective for landslide because this disaster often caused due to human activities in some specific places, so the only solution to the problem in to make necessary mitigation and preparedness measure of the vulnerable people into the safer locations rather than providing a short lead early warning alone.

Recommendations:

- EW can reach the upazila office, teachers, Imams, UP chairman and members very easily by SMS;
- Ensure activation and coordination among the institutions/committees (UzDMC, UDMC, ward committee and NGOs) and every member of each committee should accountable to their authorities;
- Development of necessary logistics, adequate funds and training may be arranged to make the UDMC active to support EW information; and
- The Operational Management Committee and Water Management Committee under the control of the Water Development Board (WDB) should be active.

5.6 Responses from flash flood prone areas

The discussions with upazila level institutions revealed that human life is not threaten by flash flood but causes enormous damage to the agriculture products. There is no formal or official EW system existing for the flash flood at the ground level. People often use their indigenous knowledge to understand this hazard, its intensity and its potential impact in a qualitative way. The following indigenous/local knowledge seems to be under use in the flash flood prone areas:

- If rainfall does not occur until mid *falgun*, there will be a huge rainfall within a short period of time resulting in flash flood; and
- People watch seepage water in the field and if they see water coming up from the ground then they pass the information to other community members so they can get prepared to erect/repair dams to protect their crops.

Weaknesses:

- CDMP should provid adequate ICT facilities in all hazard prone upazilas;
- Few of upazila where there is no PIO posted at all;
- Coordination of the dissemination process among UP chairmen is absent;
- There is no coordination among BWDB community people and local government institutions during Flash flood protection relevant development activities (embankment, dam, excavation, etc); and
- Inactive wash gates create water logging and damages are aggravated.

Strengths:

Most people are very much aware of the extent of flash flood damage. Farmers here can grow only one crop throughout the year. Hence, they remain concerned for the crops. However, there is no loss of life because of flash flood.

Recommendations:

- Flash flood protection relevant development activities (embankment, dam, excavation, etc) by BWDB. BWDB should engage community people and local government Institutions;
- Development of flash flood early warning using trans-boundary water and rainfall information;
- Ensure activation and coordination among the institutions/committees (UzDMC, UDMC, ward committee and NGOs) and every member of each committee should accountable to their authorities;
- Dredging of rivers and streams to carry more water;
- All flash flood EW must be based on up stream rainfall and water flow; and
- Early warning is necessary for agriculture because agriculture is the main victim of flash flood.

5.7 Roles, performances, linkages and suggestions

At the local level, it was found that various agencies and local entities are involved in various activities relating to disaster management but often these agencies are not well connected with the early warning related activities in a systematic way. But understanding of the regular roles and linkages of these agencies are quite important for designing DMIN. Some of the agencies have actually a very good potential to be included in the future early warning system for respective hazards.

One such example is the potential of the local NGOs and micro finance institutions (MFIs) to be included in the local level early warning. Particularly as these MFIs have very good networks at the grass root level through their regular credit or borrower networks, these groups can also be easily used for the community level early warning dissemination and faster information sharing at the household level. This recommendation is also considered in the DMIN design as a feed in to the system.

In addition, at the ground level it was found that there are some other already existing institutions or entities which have a good potential to contribute to the 24/7 day night dissemination of the early warning. Such a group is the haat-bazar committee. Usually in the rural areas the haat-bazar (daily market place) is one location where the community representatives remain awake even during the night. The chowkidar, dofadar, Ansar, VDP and community/village police who are the appointed representatives for security during the night at the village/ward level usually stay awake all night. For effective night time warning dissemination, these special groups can also be used very effectively and can be connected with the UDMC and potential UEWIC. In this process a 24/7 system can be addressed at the local level.

The following table provides a typical idea of a local setting where agencies are operating with their respective roles at the ground level. The performances of these agencies, vertical and horizontal linkages for operation and the suggested recommendations for improvements are discussed (table 5-1).

Table 5-1. Roles of local level institutions, performances, operational linkages and suggestions for improvements.

Agency	Role	Performance	Vertical and Horizontal linkages and operations	Suggested recommendations for improvement by the stakeholders
District level (DRRO, Deputy Commissioner's Office)	They receive hazard EW/information from national level agencies and forward those to all upazilas in the district. They monitor and coordinate all activities DDMC and UzDMCs, carry out awareness, preparedness and EW dissemination programme through District Information office.	There is well coordinated efforts from district level institutions to disseminate EW and disaster management related issues. There is a bureaucratic process which sometime delay DM and EW processes. There is no direct link from district to community level.	**Vertical:** DC receive disaster related information from national level agencies such as DRR, DMB, BMD, FFWC etc and send to UNOs. DC collects damage information from his UNOs and sends to national level agencies. **Horizontal:** There is a DDMC at district. DC calls monthly meeting among DDMC members and make plane to manage next hazard.	• There should be strong link from district to community level. • ICT facilities and relevant modern technologies should be increased. • Community people are not aware for EW and institutional arrangement. So awareness building to the community people.
Paurashava	Disseminate EW of Cyclone, flood and landslide to the community people based on the information from Upazila Parishad.	According to the community people their performance may be considered at satisfactory level.		• They need to communicate to local level agencies more frequently. • Awareness building to the community people for EW. • Capacity building and awareness training on EW dissemination. • Logistics and infrastructure for EW dissemination.
Upazila Parishad	UNO receive early warning from District level and disseminate to UDMCs. They open a control room to coordinate disaster management activities of different agencies and distribute responsibility among the upazila level officers and UP Chairmen. Take initiative to form medical team, financial arrangement and shelter management.	Upazila Parishads coordinate very well disseminating EW and DM related activities. Although they play vital role in EW dissemination in coastal districts but in other areas are no EW process for other hazards.	**Vertical:** UNO receive disaster relevant information from District and send to UP Chairmen. He also collects damage information from UP Chairmen and sends to DC. **Horizontal:** There is a UzDMC at upazila. UNO calls monthly meeting among UzDMC members and make plane to manage next hazard. All the members help UNO to conduct and coordinate disaster management activities at upazila level.	Disseminate EW to communities through • Ward Committee, • Haat Bazar Committee, Local Mosque, Local NGO and other people). • ICT facilities are not well set at upazilas and lack of trained professionals. • Use of modern equipment in EW should be increased. • Community people are not aware of EW process. Hence, awareness building activities need to be taken.
UzDMC	Arrange Coordination Meeting among the members of UzDMC and make resolution how to tackle the hazard coming next season. Supervise and	Efficiently Disseminate EW of cyclone to The UP Chairmen And UP Members and coordinate UDMC activities. In		• Need ICT and other logistics for EW dissemination. • Capacity building • People are not aware of existence

Agency	Role	Performance	Vertical and Horizontal linkages and operations	Suggested recommendations for improvement by the stakeholders
	coordinate EW and other disaster management activities of UDMCs.	case of other hazards they work on evacuation, relief and rehabilitation etc but not on EW.		of UDMC. • UzDMC member will be trained for building to EW dissemination.
Union Parishad/ UDMC	Union Parishad received warning message from PIO, Radio, TV and CPP. Attend UzDMC meeting. They also arrange UDMC meeting among the members and make plan to tackle next hazard. Take initiative to disseminate EW through miking or any, evacuate people to the shelters. Some cases they take assistance of law enforcement team to evacuate the affected people.	Union Parishad disseminates EW on cyclone at the extreme situation of the hazard. Besides these there are no activities on EW in other hazards.	**Vertical:** UP Chairman receive disaster relevant information from Upazila and send to UP members to disseminate to the community people. He also collects damage information from communities by UP members and sends to UNO. **Horizontal:** There is a UDMC at union. UP Chaairman calls monthly meeting among UDMC members and make plane to manage next hazard. All the members help UP Chairman to conduct and coordinate disaster management activities at union level. UP Chairmen and members operate disaster management activities coordination with upazila and local level NGOs.	• EW disseminate to all community level agency, local club and Imam. • Personnel from Union Parishad need to be trained for EW dissemination. • Increased logistics • Coordination with local hat bazzar committees during or pre hazard period. • Use of modern equipment in EW should be increased. • Awareness building activities need to be taken for the community people.
	UDMC assist CPP in disseminating EW on Cyclone at coastal areas. Some cases they do miking to disseminate EW on Cyclone. In case of other hazards they work on evacuation, relief and rehabilitation etc but not on EW.	There performance is not found at satisfactory level in the community. Most of the people are not familiar with UDMC and its activities.		• UDMC members disseminate to early warning message by miking and door to door. • Awareness building to the community people. • UDMC should be made more active by providing funds, necessary equipments and proper training to the UDMC members. • Activities of the UDMCs will have to be monitored by Upazila level GOs.
Haat Bazar Committee	Sometime they receive emergency and EW related information from UP Chairmen and upazila.	They are rarely involved in disseminating EW. Village people gathered at local hat/bazaar get scope to share any information among each Other. If hat/bazaar committees take initiatives to disseminate EW local people can easily get it.	Usually the haat bazaar committees are institutionally linked with the local UP and in particular the UP Chairman is usually the head of this committee as well.	• Awareness building for the people involved with this vital community level institutions. • Haat Bazar committee should be more disseminate to EW by door to door. • Awareness building to the community people. • They should proper training to EW

Agency	Role	Performance	Vertical and Horizontal linkages and operations	Suggested recommendations for improvement by the stakeholders
				dissemination.
Village Committee	Disseminate EW on landslide in a Particular area of Hathazari, Chittagong by megaphone.	It does not work regularly. They do it socially based on the weather bulletin from Radio/TV.		• Awareness building to the community people. • Village committee should be more disseminate to EW by door to door. • Awareness building to the community people. • They should proper training to EW dissemination.
Local Mosque	They are not entitled from govt. to disseminate EW from mosque Miking.	Local Mosques are playing a significant role EW dissemination of Cyclone and landslide. People of other hazard areas are not use to EW. So they do not disseminate EW in those areas.	They receive EW from UP Chairmen of members then they disseminate to the communities. Some cases they do miking from mosque after getting EW from radio/TV and considering current situation.	• Imam should be more disseminate to EW from mosque by miking to hazard time. • Union porishad disseminate to EW Imam. • They should proper training to EW dissemination.
CPP (in coastal aeas)	Arrange coordination meeting among Upazila and Union level. Disseminate EW on cyclone in the costal area.	CPP perform well in disseminating EW of Cyclone. People have allegation to some volunteers. From the consultation with CPP at Upazila level it was found that due to lack of fund they can not supervise their volunteers properly.	CPP have their office at national, district, upazila, union and unit office at village level. They receive information from their H_Q to Unit Office orderly. They disseminate EW and operate other disaster management activities coordination with GoB and NGOs at national, district, upazila and union level.	• CPP members more active for disseminate to early warning message by miking and door to door. • Awareness building to the community people for EW. • More training and incentives are required to maintain motivation and keep them updated on EW dissemination. issues.
Local NGOs	Most of the NGOs who work on disaster management have awareness, preparedness, relief and rehabilitation programmes to assist affected people. They usually do not have any specific EW dissemination programs in general unless they have received any grant or fund from the national and international sources. However, some of the NGOs are found quite regularly involved in relief and rehabilitation works rather than preparatory or EW related works. But	They performed well in their practical field but not in EW dissemination. However, there has been a large potential existing in making use of the NGO or Micro-Finance Institution (MFI) operated programs to be linked with the EW initiatives at ground level. Each of these NGOs have a very good relationship with local communities and usually they maintain credit groups. These	NGOs work according to the guidance from their individual head offices. They help GoB agencies to operate various disaster management activities. But they have no homogenous coordination structure at different parts of the country. It depends on the mission and vision of the Particular NGOs.	• Local NGO more active for disseminate to early warning message by miking and door to door. • They will communicate to national level agency and local level agency. • Awareness building to the community people for EW. • They should proper training to EW dissemination and building to more equipment to the relative of EW.

Agency	Role	Performance	Vertical and Horizontal linkages and operations	Suggested recommendations for improvement by the stakeholders
	NGO interest in future EW related works are there.	can be potentially linked with the EW initiatives effectively in future.		
Schools/ madrasas	Local schools tech its students and not entitled to disseminate EW at community level.	At this point some relationship is maintained during the hazard occurrence period and disaster (largely during and after disaster) but there has been a great potential of this institution for wider involvement in dissemination in pre-disaster period	Maintains vertically relationship with the Ministry of education and education department and related ones line agencies at districts and boards. Vertically they can play a very useful relationship with UP and Union DMC and for dissemination with the school students and community.	• Arranges building to student on hazard. • They should proper training to EW dissemination. Students of those schools may help to disseminate EW from their teachers.
Local Health Centre	Give health assistance to the community people. They have some health activists who work to the community people.	Largely involved during and after disaster period and not much involvement in the pre-disaster period	Maintains vertically relationship with the Ministry of Health line agencies and district health departments.	• They should proper training to EW dissemination. • They should be more active to hazard period.

Chapter 6. Proposed Design of DMIN

This chapter discusses the issues of designing a disaster management information network that would facilitate the national DMIC currently under development and expansion through the CDMP assistance to the Government of Bangladesh. The CLIFMA findings contributes towards the development of the DMIN design through updated information and and understanding of the empirical needs, do-ability and preferences of the local level stakeholders including the community and the local professionals operating at the grass-roots level.

The chapter starts with discussing the various layers of recommendations such as recommendations from institutional FGDs and recommendations from community and household level interactions. This list of recommendations is analytically compared and used as the inputs for the DMIN designs elaborated in the next chapter.

6.1 Recommendations from various levels

6.1.1 Recommendations from Institutional FGDs

- Any rapid early warning related information should be sent directly to the UP Chairman through **cell phone call or SMS services** from the national level sources (BWDB, BMD and DMIC). This should be done in parallel to the formal letter, fax, e-mail services to UNO and DC offices. Arrangements with mobile operators can be made in this regard. Institutional representatives suggested that the existing formal process of EW information takes a longer time and often creates administrative delays from national sources to the community level. To reduce this time delay, EW **information can be sent directly to upazila and UP levels in a simple SMS message protocol or voice format**. Such templates or protocols need to be developed in consultation with the local level stakeholders. A database of early warning recipients (information focal points) with adequate provisions for regular updating can be developed as well.

- It was pointed out that upazila and union parishads should have **adequate provisions for financial and technical arrangements for dissemination of EW** (microphone, motor boat, speed boat, cell phone, megaphone, walky-talky, rickshaw, van, etc) to support EW related activities for wider dissemination of early warning information. A permanent responsible person with proper IT facilities needs to be assigned to manage the institutional activities on disaster management at the upazila level. Upazila and union offices should have the necessary logistics, manpower, adequate funds, training and vehicles to disseminate the EW information.

- It was suggested that the **Union Early Warning Information Centre (UEWIC)** can be developed at the union council where locals can get all the EW information and disaster related information as well. From institutional FGDs it emerged that there is currently very little financial support for EW dissemination. Most of the funds are available for disaster rehabilitation purposes. Hence, whenever, any EW comes to the field level offices (upazila and UP) they do not have the financial resources that can be used for the EW purposes for dissemination of EW to the community level.

- **Volunteers** can be recruited and trained for EW dissemination purposes. There has already been some good examples such as CPP volunteers in coastal areas. However, there are no such formal arrangements of volunteers in other disaster areas. Even where there are CPP volunteers they are not enough in numbers. They are also

not updated with regular training. They need to be updated with refresher training and motivational activities to keep them more engaged with any EW dissemination processes. However, these volunteers should be paid with some amount of money for emergency unforeseen expenditures such as transport, logistics and EW miking.

- **Capacity building and training for professionals** of institutions at different levels should be considered seriously. Adequate training programmes have to be implemented for institutions from upazila down to the communities to make them aware of EW for different hazards and dissemination methods for those hazards. Trainings also need to include programmes to address the technology part of EW dissemination. These may include PC usage, internet, EW information gathering, and the DMIC website and other national level source sites. Participants in most of the IFGDs presented examples that even after receiving EW, a large number of people do not want to respond to it. This is because of a lack of awareness about EW and partly because of their inability to respond. This inability might be attributed to their reluctance to leave their households behind. To improve this situation, awareness of the disaster prone areas needs to be enhanced and safety of their households has to be ensured as well.

- **Social awareness and mobilization** programmes need to be undertaken on early warning. Participants in most of the IFGDs presented examples that even after receiving EW a significant part of the population does not want to respond to the EW. This is because of a lack of awareness about EW and partly because of their inability to respond. This inability might be attributed to their reluctance to leave their households on security and safety grounds. To improve the situation, awareness of the disaster prone areas has to be enhanced and safety of their households has to be ensured as well.

- The NGOs who have **micro finance programme** and field workers can be engaged with the EW information dissemination activities. Micro credit disbursing agencies have their well organized participants and formal communication networks among participants. Micro finance institutions (usually national NGOs) have their well organized development workers who have a strong relationship with the vulnerable communities. These micro finance networks and development workers should be linked up effectively for local level EW information dissemination.

- FFWC, DMB, DMIC, BWDB and MoWR need to keep their **websites** updated and available all the time. Many of UNOs and other officials who are engaged with EW dissemination from upazila to the communities strongly recommended keeping the web resources on the national level institutions through FFWC, CDMP, DMIC, DMB, BWDB and MoWR. If these web resources are regularly updated with the latest EW information then field level officers need not wait to receive formal EW from any other sources. Institutional representatives also suggested that a guideline be developed so that they know how and which information the field level officers can use for EW. Provisions for this web-based EW can reduce huge administrative problems and can save a lot of time during emergencies.

- Rapid onset flooding often occurs due to huge water flow in a short period of time from the trans-boundary rivers. It was identified that the UNO and DC offices should have access to such **data/information relating to rainfall and river water levels** (of regional and international rivers from Nepal and India) from source agencies such as FFWC/BMD/SPARRSO.

6.1.2 Recommendations from community FGDs and households

- **Ensure the functioning of existing local government institutions:** In the community FGDs it was found that the UDMCs at the institutional level and the community at the ground level do not have a clearly defined role on early warning and early warning dissemination at the ground level. Although it was found that on a number of occasions the UDMCs are formed, these were found quite non-functional in many cases. During the CFGDs it emerged that these local level DM committees should be strengthened immediately and to ensure accountability of their activities in early warning dissemination and disaster management in general.

- **Parallel communications/information system upto the union level:** A system of parallel communications/information flow of EW messages from the national level downwards is sought. At present, for most of the hazards, the EW messages often come from the national level to the districts and then from the districts to the upazilas and finally to the union/community levels. In this process often for the rapid onset hazards a great deal of time remained lapsed and resulted getting ever limited time for dissemination by the community end responders. Keeping these delay issues in mind, both the community and household levels request the development of a parallel emergency communication system from the national to union levels directly. If the information can reach directly from the source agencies to the union level then the community will get more time and would start preparations immediately from the point of receiving the message.

- **Establishment of EW information center at the union level:** It emerged from the community level FGDs that the Union Early Warning Information Centre (UEWIC) needs to be established at the union level to strengthen the local level EW dissemination system. Four to five trained personnel/volunteers (from the existing committees) can be engaged for this and minimal necessary equipment for warning dissemination and public addressing can be kept with UEWIC. These UEWICs at all UPs can be directly linked with the national DMIC for dissemination of hazard early warning information. Besides these, community level committees such as Hat-Bazaar committees and mosque committees can be engaged for EW purposes and can be effectively linked with the UEWIC for a 24/7 system.

- **Community and stakeholder awareness and social mobilization of EW systems:** It was suggested that the government needs to establish various awareness and preparedness, training and social mobilization programmes for the communities and relevant stakeholders to make them aware of EW and capacity building. Various arrangements of local cultural programmes to address EW response, video screening on past severe occurrences, meetings, seminars, workshops, rallies and so forth can be regularly arranged at the local level.

- **Improvement of the EW warning messages for effectiveness:** EW message contents are a very important component of the overall success. However, a relative understanding of different hazards is an issue and thereby more understandable early warning messages should be developed further for each respective hazard focusing on the local dialects, geographical situation and livelihoods perspectives. These messages should be easily understandable and community friendly. For example, in the cyclone prone coastal areas, communities are quite familiar with EW messages but often have problems with a sudden jump of categories as well as understanding the differences of the maritime warning categories. In the flood prone areas also, people are not always aware of the danger level. So, these communities seldom understand the message content. The content should include the potential area of

inundation and duration of flood inundation along with the water level information. Similarly in the drought prone areas, the drought affected community suggested seasonal forecasting of drought with specific information of rainy days, non-rainy days and duration.

- **Sequential EW message flow and types:** Sequence of the signal numbers and message content in cyclone and other hazard prone areas should be disseminated in a proper way. EW messages can be translated into local languages to make messages easily understandable to the mass community and engaged professionals/volunteers. Communities strongly feel that Bangla SMS-based EW is effective and voice SMS EW through cellular phone would also be very effective.

- **Logistics, motivation and other needs:** It was suggested in the community FGDs that the government should provide necessary equipment for a public addressing system. For example, megaphone, microphone, rickshaw/van, cellular phone, wireless, walky-talky and similar communication equipment to UzDMC, UDMC, ward committee, volunteers and others associated with the EWS at the local level.

- **NGOs Involvements:** There are many very active NGOs working with the communities in almost all hazard prone areas. Involvement of these NGOs in EW dissemination would really strengthen the local level EW dissemination process. Most of the NGOs have good networks at the community level and have local knowledge in their respective geographic areas. These networks could be effectively utilized for local level dissemination of the early warning.

- **Integration and coordination:** Integration and coordination needs to be ensured and strengthened among national level EW information sources, community level committees, Hat Bazaar committees, mosque committees, CPP, NGOs and local government institutions for EW dissemination to the community. Besides these, regional and international coordination among meteorological departments must be ensured to produce EW information properly.

- **Avoid bureaucratic barriers:** During a rapid onset hazard, the community wants to receive EW directly from the national level in order to avoid middle men. They also think that in case of regular, slow and seasonal onset hazards its necessary to develop direct communication among national level information sources and UEWIC, UDMIC, UzDMIC, community level committees, Hat Bazaar committees, mosque committee, NGOs and local government institutions.

- **Community preference of local level institutions to receive EW:** Regarding cyclone, the community wants to receive EW from CPP, Union Early Warning Information Centre (UEWIC), UDMC, UP members, community level committees, Hat Bazaar committees, mosque committees, NGOs and other government officials. Concerning a rapid onset hazard, the community wants EW directly from the national level sources passed on to UEWIC, UDMIC community level committees, Hat Bazaar committees, mosque committee, NGOs and other government officials at the community level in order to avoid middle men. During flood, the communities strongly feel that Bangla SMS-based EW is effective and EW in the form of voice message through cellular phone will be very effective and popular as well. Communities in other regular, slow and seasonal onset hazard prone areas also wanted direct communication among national level information sources and UDMIC, UEWIC UzDMIC, community level committees, Hat Bazaar committees, mosque committee, and NGOs be established.

- **Unwillingness to respond to early warning information:** During the community FGDs, it emerged that there has been a great deal of unwillingness to respond to EW messages. These are often because of a lack of knowledge or often because of fearing the loose of household assets. Recommendations were to find provisions of safety for the people as well as their assets.

- **Training and capacity building of the union level agents on early warning:** In the community and household level field findings, it became very prominent that the training and capacity building of the UP, local volunteers, UDMC members and others at the community level on EW issues and dissemination is essential for success. The local level DMCs and communities are not familiar with EW and there is a great need to raise awareness among these stakeholders so that people can understand the importance of EW information and start taking actions toward building community based early warning systems. In this line, capacity building, workshops, for government and non-government staff and volunteers to refresh and update their knowledge, motivate and encourage for community based early warning in a sustainable manner.

- **Lack of funds for local level institutions and volunteers:** In many cases, local level institutions suffer from a lack of financial support for necessary logistics for dissemination of EW information down to the household level. FGDs revealed that they receive information on the forthcoming disaster from different sources even before through the existing EW system. But people and UPs often cannot disseminate this information to the widest and remotest possible locations due to a lack of logistic support such as transportation.

- **Use of exciting local level special community level committees in EW dissemination:** Haat Bazaar committees, community based committees, mosque committees, and local youth clubs are a few examples of socially based special committees existing at the grass roots level. Some of these are voluntary and some are associated with minor incentives. People suggested that these groups should be more effectively connected to the EW dissemination process. These groups could be a useful vehicle for miking, information sharing at Haat Bazaar (i.e. market place) and so forth. If these institutions can be integrated in the new DMIN system then it would contribute positively towards the sustainability of the local early warning systems.

- **Increase engagement of cellular phones into disaster communication:** One of the more recent developments in rural communication is the massive boom of the cellular phone in Bangladesh. People in the communities suggested that this available technology should be used more regularly for risk and disaster communication. Arrangements should be made between these public service providers, their local call centers and outlets with the local level early warning agents in a more proactive way.

Comparative overview of the recommendations:

Based on the recommendations received from various layers, a compilation is provided in the following table to provide a comparative understanding of what type of suggestions have emerged from which levels (Table 6-1). The "+" sign is used where the recommendation has been raised from the respective level and the "++" sign is used when there has been prominent and repeated mentioning of that respective recommendation.

Table 6-1. Compilation of some of the key recommendations for improvement of community level EW system from various level sources.

SL No.	Recommendation	Level it came from		
		Institutional	Community	Household
1.	Institutional strengthening through organizing committees at local level on EW and DM	+	++	+
2.	Provision of public awareness and educational programs	+	++	++
3.	EW public addressing system (e.g. mike, radio, megaphone etc.)		++	++
4.	Door-to-door and road to road visit EW dissemination		+	++
5.	NGO mobilization and engagement of MFI for EW	++	++	+
6.	Option creation for response to EW also sheltering provisions (e.g. cyclone shelter) and structural protections (e.g. embankments)	+	+	++
7.	Timely availability/ sharing of EW information		++	+
8.	Formation and strengthening of Union based Early Warning related entity	++	++	++
9.	Strengthening of UP/UEWIC with minimum required public addressing and communication system	+	++	+
10.	Encourage systematic volunteerism for EW	+	++	+
11.	Training and capacity building	++	++	+
12.	Web-based protocol development	++		
13.	Parallel direct communication/information receival system at union level	+	++	++
14.	SMS-Cell phone based dissemination development	++	++	++
15.	Database/list of the EW information recipient/focal points	+	++	+
16.	Rainfall and water level data availability at district/upazila level	++		
17.	Minimal Financial support for early warning by the Government	++	++	+
18.	Sequential progression of EW signals (i.e. not directly jump to higher signal)		+	++
19.	Provision of safety of household assets		++	++
20.	Provision of safety of livelihoods assets (e.g. livestock)		++	++
21.	Coordination among local level agencies/entities for EW	++	+	
22.	Priority to the community preferred messages		++	+

6.1.3 Design inputs

Taking a stock of these past experiences and the CLIFMA findings/recommendations, the first cut of the design inputs have been developed. These design inputs from various layers sequentially provides the raw ingredients for the DMIN designs. These are also the pre-conditions designing the DMIN (please see the Table 6-2 for details).

Table 6-2. Past experiences of various initiatives (discussed in Chapter 3) and CLIFMA findings/recommendations are sequentially developed towards design inputs.

	Past experiences (various initiatives)	CLIFMA findings	Design criteria
Institutional setup	Formal setup as well as direct communication to the local setup is encouraged	UP should be strengthened and possibility of a Union Early Warning Information Center (UEWIC) associated to the UDMC/UP and UzDMC should be developed. Haat bazaar committee additional inclusion for decentralization (e.g. NGO involvement, haat-bazar committee inclusion) can be encouraged.	The formal system of EW should be developed through the formal administrative line but at the same time a decentralized direct parallel system of information sharing from DMIC/sources should reach to the union levels. Particularly for rapid and seasonal rapid hazards.
EW detection sources	BMD, BWDB(FFWC), Research institutions (national)	Same as existing but with request for further improvement	BMD, BWDB(FFWC), Research institutions (national and regional)
Dissemination technology from Upazilla to downwards	Formal mode and usually information is sent to districts administration and district level departments first departments. In various recent projects various parallel modes are also preferred. CPP had developed a parallel dissemination system quite long back and operating successfully	Formal and parallel communication up to UP from the central level. The formal communication is required to start the administrative machinery of government and line agencies. But the parallel system directly transmission information to union level can minimize the loss of time and would encourage a local level mobilization More regular coordination needs to be taken place on EW focal at formal level	Formal and parallel communication/transmission system should be developed for rapid systems (up to UP) and this can be linked with central DMIC on a 24/7 basis. The various types of innovating sms and voice based methods can be popularize Local level focacl points at union level can be identified and a dynamic updatable database can be developed.
Dissemination technology from UP to downwards	Voluntary through the Ups + national TV and Radio. CPP has developed a volunteer based notification for number of years and CFAB/CFIS has institutionalized cell phone and flag hoisting method for flood.	Formal and parallel communication to UP from the central level was sought but in addition to that for household level dissemination "public addressing systems" were sought (e.g. cell phone, megaphone, Radio, TV, siren etc.). Formation and mobilization of local accountable groups are also a need.	Formal and parallel communication to UP + also through the DMIC (formal)+ NGO mobilization and network development. The CFAB/CFIS process could be useful for rapid onset and seasonal onset hazards focusing cell phone and flag hoisting method. While CPP type of network can be expanded in other areas with more formal and civil society inclusion. NGO MFI groups

	Past experiences (various initiatives)	CLIFMA findings	Design criteria
			could be useful in that.
DMIC consideration	In existing situation mostly the information are shared from the source agencies to DMB/DMIC and DMIC produces the "Situation Report" which goes to the upazila level	DMIC situation reports are found quite important for mobilization of the district administrations (through DC and DRRO to PIOs). But the capacity seems to be far from sufficient. There has been a need for Union level linkages of DMIC portal.	Design component should fine out an active network for collaboration with DMIC – its portal under development and functional modalities to link with the Union Disaster Management Committees as well as need to adopt a decentralized system developing modalities to incorporate civil society entities at ground.

6.2 Proposed designs for DMIN

In order to design the first draft of the DM information network that will be nationally functional in the future, a host of recommendations and other existing designs have been reviewed. As in the earlier section we have found that the design derivatives have also came from the various layers of recommendations collected during the CLIFMA field study.

Taking stock of all these issues, experiences and recommendations for the DMIN design derivatives, two designs are proposed -- one for emergency time rapid onset and rapid seasonal onset hazards, and the other for regular time operation of slow and seasonal onset hazards.

- **Proposed DMIN Design-1** (Figure 6-1): This first design is primarily for the rapid and rapid seasonal onset hazards and this has both the regular time hazard warning and information sharing mode as well as the emergency mode. The design has two major provisions which are parallel methods. When any hazard warning comes from the source agency the hazard EW starts from the central source agencies (such as BMD and FFWC) and through their regular modes the FFWC and/or BMD will issue a formal warning to their regular list of dissemination recipients which includes DMB (including DMIC), DRR control room as well as ministries, respective authorities and the media. It is expected that under the DMB in future, the central DMIC will work as a central control room with a functioning 24/7 system. In this line, during the rapid onset hazard, DMIC from DMB should be able to receive the information and transmit the warning to the following pre-listed focal points:

  a) The regular administrative channels (to districts DC/DRRO offices and their district DMICs; and

  b) Community based Union Early Warning Information Centers (UEWIC) which is proposed under the present study as an "intermediary measure" to establish the future UDMIC (which is under the long term planning of taking DMIC at the union level). It can be expected that UEWIC will have a minimal capacity to receive the EW information over cellular phone and also have the capacity to organize dissemination through the UDMC focal points and other community entities with some facilities available for public addressing systems such as miking facilities.

  In the figure the **red line** represents rapid onset risk communication and the **black line** represents regular, slow seasonal onset and slow onset risk communication which has enough lead-time for formal institutional machinery to operate. During the rapid

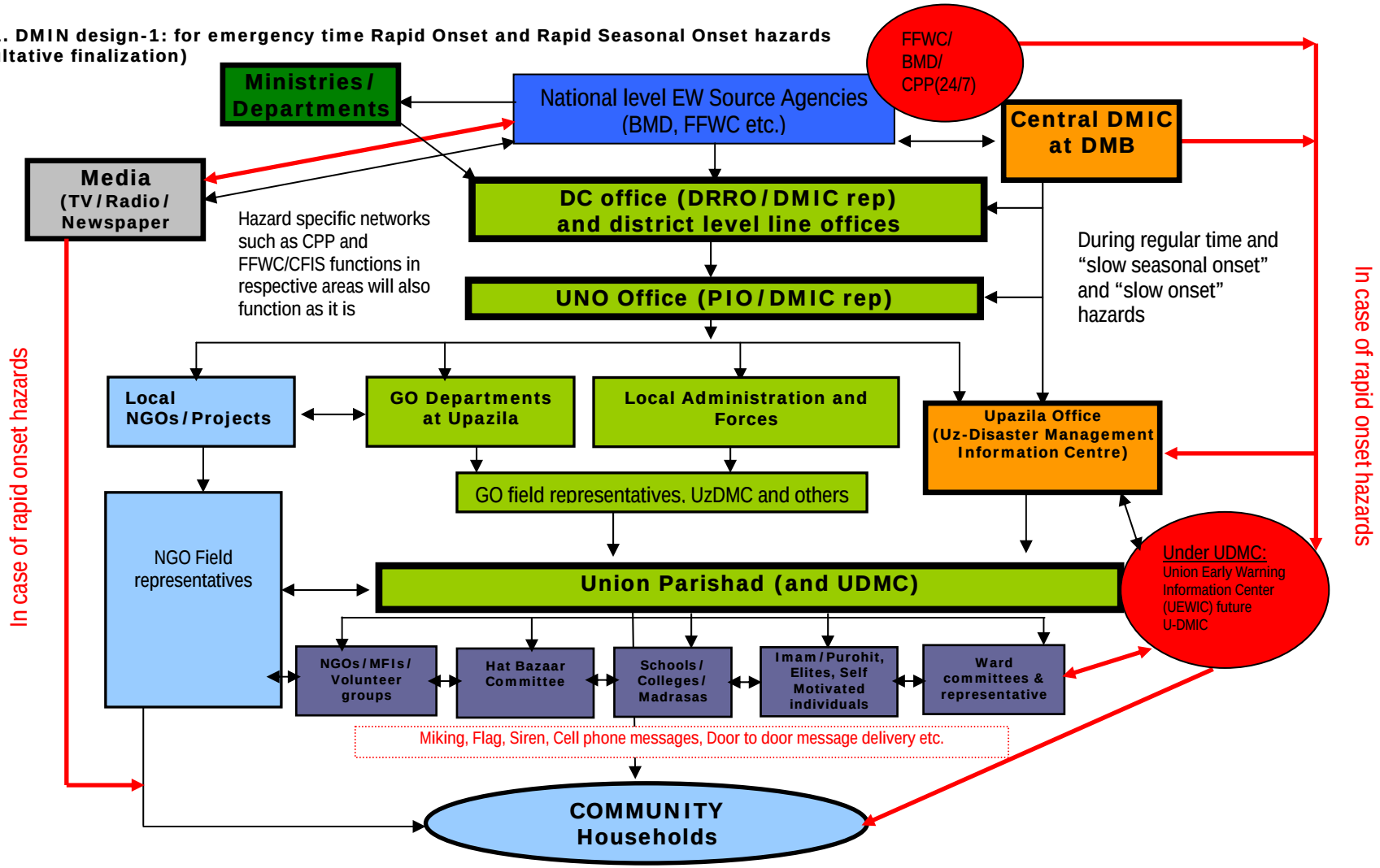
onset (both episodic and seasonal), the system starts a voluntary rapid step (**red line**) and follows up with the regular formal institutional procedures for resource mobilization and so forth.

This particular parallel system with **red line** is not expected to nullify the formal system. Rather, this is a complementary system to the existing formal system which flows through the regular administrative system. This is just for a faster process of EW information sharing provision in favour of the community and would be formally endorsed by the districts and upazila administration when they formally convene the meetings and routine operation of emergency preparedness and response. The newly proposed UEWIC and the **red line** will be fully integrated with the existing DRRO and PIO operations as well as with the any available initiatives of FFWC or CPP in general.

- **Proposed DMIN Design-2** (Figure 6-2): The second proposed design of DMIN is primarily for the slow and slow seasonal onset hazards. This is also a design for regular hazard wise advisories and EW information sharing. This network follows primarily the sectoral line incorporating the DMIC into it. For example, this design would be useful for slow onset drought or other slow onset hazards. Following the regular time progression, the disaster and hazard related information and actions can be taken continuously through this network. Primarily, the disaster management information system would be mainstreamed into the overall agency and sectoral networks where the hazard specific developments and situations can be addressed on with a regular basis. Besides the rapid onset hazard network for very urgent emergency rapid onset hazards (Design 1). This design will also complement the DMIC with a regular information sharing mechanism to the community and respective agencies and will always remain in touch about regular activities. This habit would allow DMIC to become more usefully networked with the other departmental and sectoral networks and operations in a complementary way. This would be a value added system for the DMIC in the future. Through this design in the regular system, DMIC can also collect information from the ground on the other risk and disaster management information in a bottom up manner.

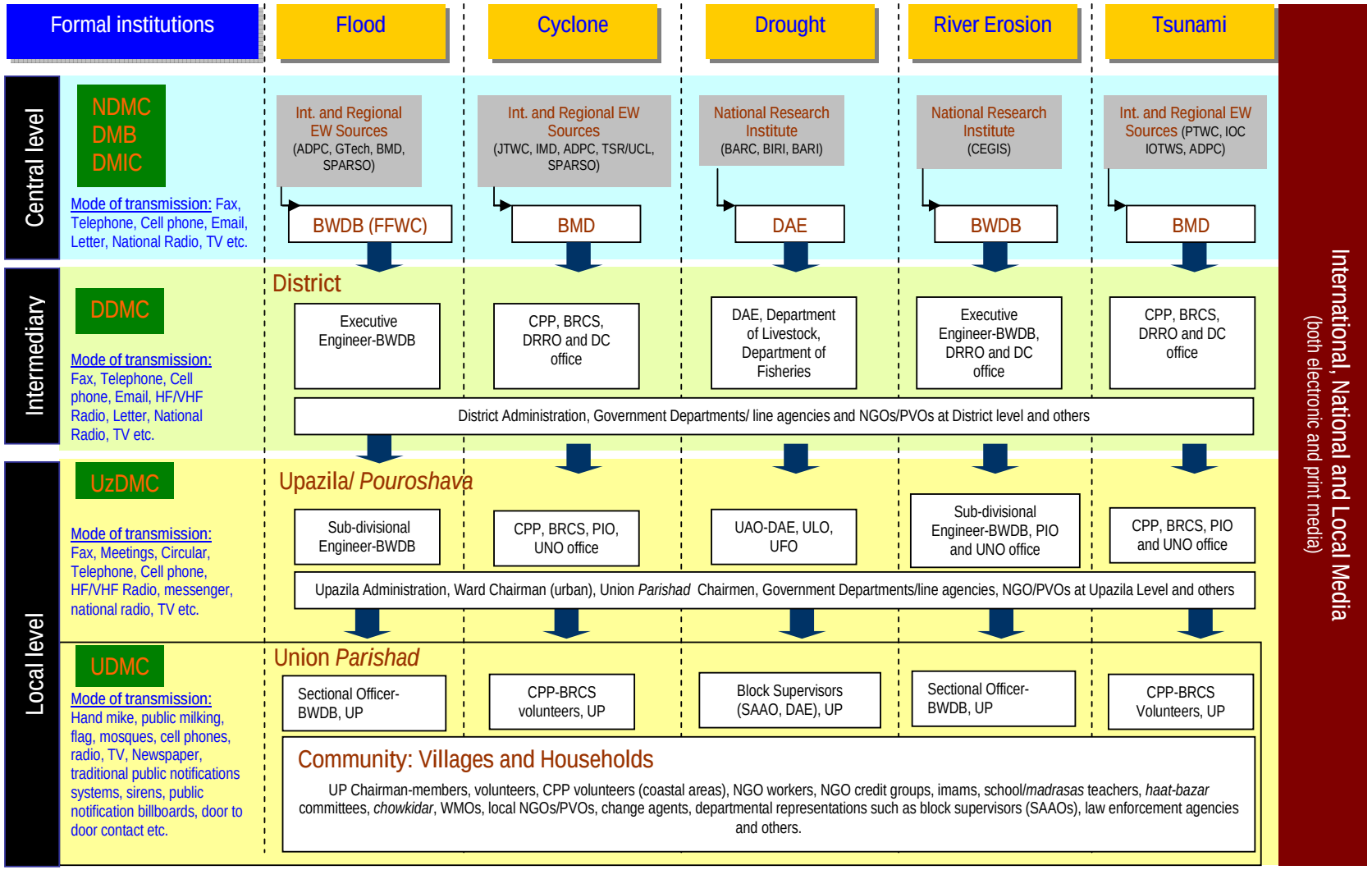
The two proposed designs are graphically laid out in the following section for a greater clarity. The preliminary operational methods of this proposed DMIN network are also outlined in the section.

Figure 6-1. DMIN design-1: for emergency time Rapid Onset and Rapid Seasonal Onset hazards (for consultative finalization)



Note: Red line represents rapid onset risk communication and black line represents regular, slow seasonal onset and slow onset risk communication which has enough lead-time for formal institutional machinery to start operate. During the rapid onset (both episodic and seasonal) the systems starts a voluntary rapid step (red line) and follows up with the regular formal institutional procedures for resources mobilization and so forth.

Figure 6-2. DMIN design-2: for regular time operation of slow and slow seasonal onset hazards. (for consultative finalization)



Source: Adapted and updated from ADPC, Oct, 2008

6.3 Operational EW transmission methods of DMIN

Following the proposed DMIN designs, the transmission of information can be followed as described below.

From national level EW source agencies to district and upazila levels:

The EW source agencies such as BMD and FFWC will send EW to their regular list of dissemination recipients such as ministries, departments, DMB, DRR, army, navy, and media. DMIC will also receive the information directly from them and, in association with DMB and DRR control room, will disseminate the EW information to the district and upazila levels.

Upazila to union level:

At upazila level there will be established (long term vision of DMIC, but at present UNO with PIO is doing this operation in a minimal scale at each upazila) an Upazila Disaster Management Information Centre (UzDMIC) where dedicated officer will be assigned permanently especially for early warning information exchange. UzDMIC needs to be properly funded and well equipped with the technical, human and financial provisions to receive early warning and pass the warning to the lower layers effectively with confirmation. In regular time this network will also help to bottom up needed disaster management related information. Minimum technical equipment needs to be ensured. UzDMIC will also coordinate with the district DMIC (at present they are coordinating with DRRO) and DC offices. This layer will ensure the coordination between activities of all UDMC and the union level for taking necessary steps for EW dissemination with NGOs and other stakeholders functioning at the upazila level and downwards.

Union level:

Similarly, at the union level, in all Union Parishad a UP member needs to be assigned and compensated by the government to coordinate activities of all UDMC members and NGOs working on disaster management at the union level. We want to call it the Union Disaster Management Information Centre (UDMIC). It will work under UDMC. UP Chairmen may supervise UDMIC activities.

UzDMIC will provide EW information to the upazila level GOs such as Upazila Agriculture, Fishery, Livestock offices, Ansar VDP, DPHE and others concerned with disaster management. It will also provide EW to UDMIC, local level NGOs and schools, colleges and madrasas. Local NGOs and upazila GOs will disseminate EW information to the community people by their field representatives. Teachers of educational institutions will disseminate EW by their students and staff.

The newly proposed Union EW Information Center (UEWIC) as part of the Union Disaster Management Committee (UDMC) needs to be operational in this layer as this is one of the major identified gaps in the overall chain of EW information flow.

Community and household levels:

UEWIC and UDMC can provide a step-up with the dissemination of EW making use of other social institutions/entities on the ground such as local Haat Bazar committees, schools, NGOs/MFIs, youth clubs, Imams, Purohits, local elites, ward committees and self motivated persons. Haat Bazar committees will take initiatives to disseminate EW in their Haat Bazars through miking or beating tin/Dhol/Dhol sorod. Youth clubs and self motivated persons will communicate with Union Parishad and may give voluntary services. Imams will disseminate

the EW from mosque miking; local elites may disseminate EW to their known/subordinate persons.

Additionally, UDMC needs to take initiative to disseminate EW to the community people by miking road to road, and hand miking in the poorly communicated areas. Chakidar and Dafadar may be assigned to do the miking. Door to door and road to road miking provisions are sought by the communities studied.

Example in case of rapid onset disasters (particularly in the coastal areas):

In the case of rapid onset disasters the whole network may step into a voluntary mode but with fully predefined accountability and a clear designation of roles and responsibilities through regular time meetings. These are to be conducted through the Union Disaster Management committees through active involvement of the UNO and the local NGOs and civil societies.

Step 1.
Deputy Commissioner, Upazila Nirbahi Officer, NAVY Headquarters, Coast Guard HQ, BDR Headquarters, Police Headquarters, Head of Port Authority, BDRCS and Army Headquarters need to receive early warning messages by wireless, police wireless, telegram, cellular phone, fax and other forms of communication from the national level sources.

Step 2.
All the heads of the institutions send the warning message immediately to the costal areas and heads of costal districts by wireless, police wireless, telegram, cellular phone, fax etc..

Step 3.
In this stage all UP/UDMC, CPP, NGOs ward committees, bazaar committees, Imams and teachers will inform their volunteers. All UP Chairmans, Heads of bazaar committees, head of NGOs, Upazila CPP offices, head of ward committees will send individually group template SMS to the members of the committees. Besides this all UP Chairman will send template SMS to Imam/purohit, teachers, social elite persons and self motivated persons.

Step 4.
One or two responsible members of the each committee will send group information through their local means of communication such as cellular phone, door to door communication through volunteers, and public notification systems for public address such as mikes, megaphones, and mosque mikes.

Chapter 7. Pilot Testing Plan

The present project has come up with various layers of activities and at present stage has accomplished several milestones. Such major milestones are: a) the "Disaster Management Information Link Report" that has come up with secondary review and institutional level observations to document the major links and gaps existing from national (source level) down to local level (upto union); b) the current CLIFMA study which documented the field study findings and proposed designs for DMIN. With this given background, the project has reached into a stage to conduct field level pilot testing for three predominant hazards in the country. In this line, the present chapter provides a methodology of this pilot testing.

7.1 Rationale and objectives of pilot testing

The present report came up with the findings from various layers down from upazila to household level and proposed DMIN designs for making the early warning network operational down from Upazila to household level. The final designs for DMIN will be recommended to CDMP and the government from the present project. Before providing these recommendations, a careful round of field testing is organized through a systematic process of incorporating hazard-wise pilot field testing procedures through community level demonstration, mock exercise-validation etc.

The major objectives of the field level pilot testing are to:

- Test the DMIN designs that are recommended from the present project, CLIFMA study and various other past initiatives/projects for the major hazards in the country;
- Through mock-drills simulate and test the information flow procedures for its rapid transmission upto household level;
- Receive recommendations for standardized community level early warning dissemination systems (dissemination modes, messaging packages, institutional structure, sustainability issue etc.) down from upazila to household level;
- Compile recommendations for future establishment, improvement and replication for the national level network (DMIN) that will be functional down to upazila level.

7.2 Selection of hazards and districts for pilot testing

In order to come up with a selection of the pilot testing the DMIN design, three most prominent hazards are adopted. The CLIFMA study findings suggested that people pointed out three hazards as most prominent and frequently affecting their households/community in a regular manner. These are: a) riverine flood, b) cyclone/storm surge; and c) riverbank erosion. Reflecting these findings these three hazards are finally considered for pilot testing.

In order to identify the pilot districts three districts are selected from a various consideration and triangulated with a verification of different sources of information such as: a) CLIFMA field study experiences; b) expert level discussions (particularly with FFWC/BWDB, BMD and others); and c) various hazard specific scientific information. On the basis of above three the following three districts for three respective hazards are recommended. These districts are:

- **Riverine flood:** Sirajgonj or Gaibandha district;
- **Cyclone/storm surge:** Bagerhat district;
- **Riverbank erosion:** Sirajgonj or Gaibandha district.

Scientific rationale for selection of these districts is also given in the section 7.4-7.6.

7.3 Selection of pilot upazilas and respective communities

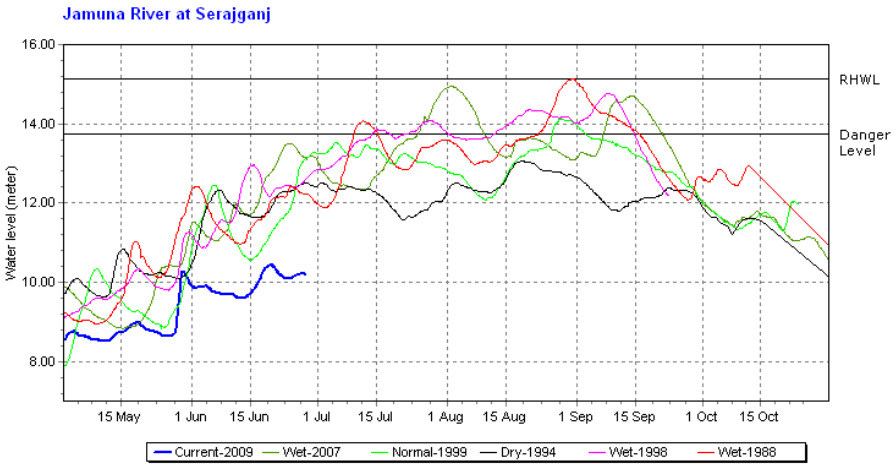
The final selection of upazilas and communities for piloting needs to be based on discussion and consultation with local agencies, NGOs, local disaster management committees and local people in suggested districts. This needs to be carried out through a reconnaissance field trip. During the reconnaissance field visit the team can run the following suggested matrix to carry out an evaluative selection of community from that district. Some criteria are specified in the matrix.

Community/ village name	Past Hazard history in last decades	Availability of the early warning	Damage and losses patterns	Robustness of geographical characteristics	Selection

7.4 Pilot testing for "riverine flood"

Riverine flood has been a phenomenon of rapid and seasonal rapid onslaught in various parts of riverine Bangladesh. Particularly in the Brahmaputra-Jamuna river basin, this has been a major hazard and the community level vulnerability is also high. Various agencies including FFWC have developed both deterministic and probabilistic models to predict the river water level during a riverine flood. However, at the ground level, it was observed that in this large riverine area, particularly in the upper ridge of the Brahmaputra river, considerable early warning gaps are existing which shows a need a system for faster and trusted early warning information transmission from upazila down to household level. The historic hydrographical data suggest that Sirajgonj and Gainbadha districts remained as highly vulnerable to riverine floods pretty much on a regular basis.

The following hydrographs suggest that locations of both the districts are regularly crossing the river danger level and also hit the recorded heights water level (RHWL) in the past. The hydrographs comparing the most affected years and the water levels are shown in the first and second hydrographs of figure 7-1. The first figure suggests gives historical data on the Jamuna river at Sirajgonj point which is the major relevant point for that district. In the second hydrograph of the Jamuna river at Bahadurabad indicates levels for the Gaibandha district.



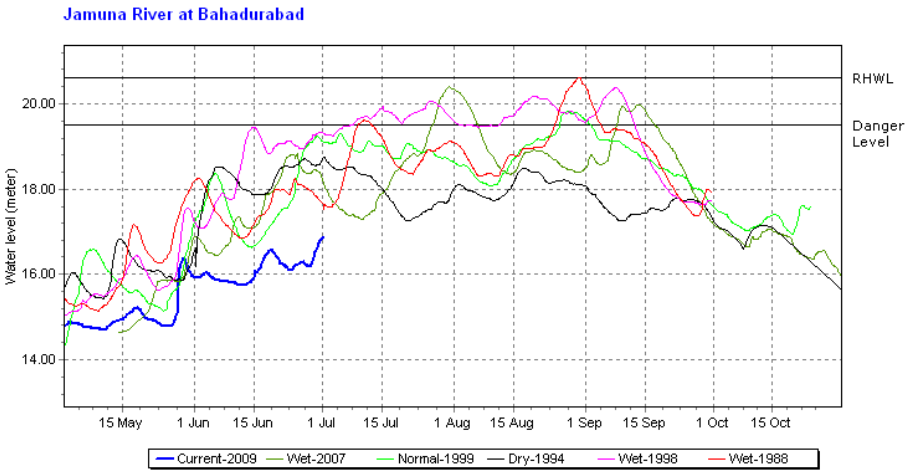


Figure 7-1. Analytical comparison of the hydrographical data of the past years in two locations (Sirajgonj and Bahadurabad) relevant for Sirajgonj and Gaibandha respectively.

Recommendations for "riverine flood" related piloting:

- For this type of piloting, both the DMIN Design 1 and 2 (please refer to chapter 6, figure 6-1 and 6-2) are recommended for testing.
- As the historical data suggests that along the Brahmaputra-Jamuna river system both Sirajgonj and Gainbandha districts are highly vulnerable and have crossed the danger level on a regular basis, the pilot testing communities can be taken from these two districts. Communities from these two districts are also studied during the CLIFMA field investigations.
- For packaging of information and messaging, the CFAB/CFIS-FFWC model is recommended with additional features (please see chapter three for details of the CFIS/CFAB dissemination approach).
- In recent months, the MoFDM has also signed a MoU with the popular cell phone companies (i.e. Grameen Phone, TeleTalk) to introduce cell phone based early warning dissemination system for riverine flood. Sirajgonj district has been considered for such piloting for riverine flood early warning. It is recommended that the DMIN piloting initiative can be collaborated with the new cell phone system.
- It is recommended that during piloting an active/operational network be promoted with the central DMIC as well as the district level DMIC in a dynamic manner.
- Local institutional arrangements for flood early warning dissemination can be strengthened involving the local based MFI groups as well as with the community based entities such as Haat Bazar committees, UP and so forth.
- This is recommended that to maintain a sustainable community based early warning system, necessary collaboration with the local government departments (such as DAE, Department of Health, Department of Education, Department of Livestock and other departments) are being made.
- Strengthening of the Union Disaster Management Committee through the formation of the Union Early Warning Information Center (UEWIC) is also strongly recommended as part of UDMC.

7.5 Pilot testing for "cyclone/storm surge"

The very recent experiences of cyclonic tracks and landfalls as well as some scientific analyses (e.g. Peterson and Islam, 2009) have started to comment that the south-western division of Bangladesh has a high vulnerability to cyclone/storm surge in the country.

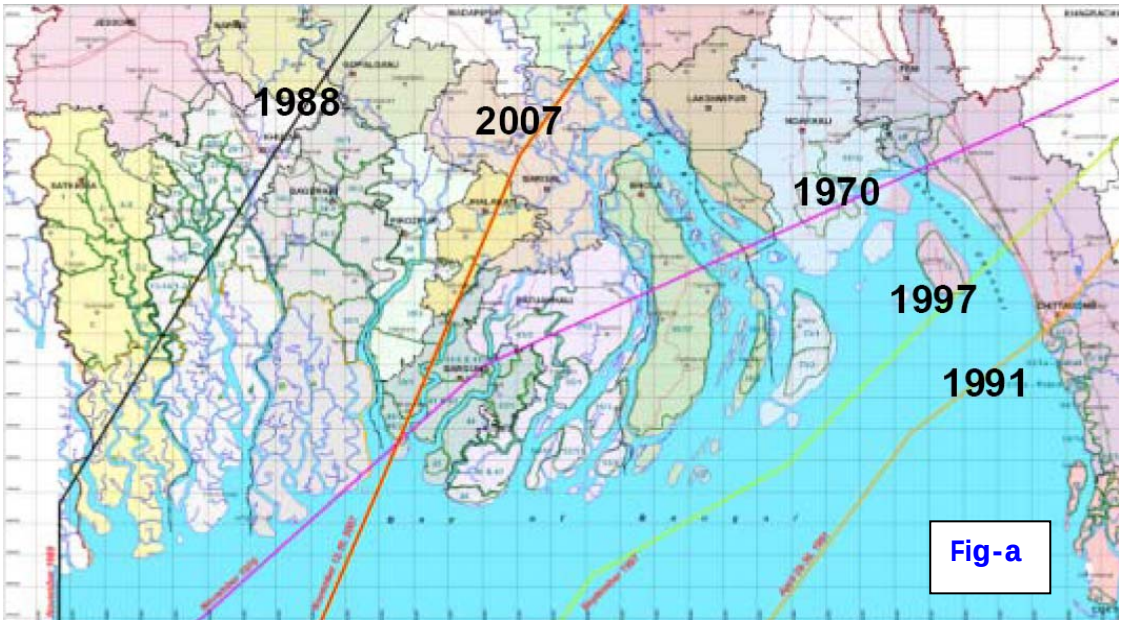
Some of the exposed coastal upazilas of the southern part of the country particularly in the districts of Bagerhat to Barisal has shown a large amount of societal and livelihoods vulnerability to couple up with the cyclonic and surge impacts. In recent years, the landfall of cyclone Sidr (in 2007) and Aila (in 2009 indicated the same pattern.

The following few figures show that the Bagerhat district has been affected in recent times. In the recent cyclones particularly during the Sidr and Aila a demonstrated weaknesses for community based early warning dissemination particularly at community and household levels has also been demonstrated in this district. The recent pattern of the cyclone tracks are shown in the figure 7-2.

As during the 1980's and 1990's several major cyclone hit the eastern coast of the country, a lot of developmental activities relating to the cyclone/storm surge preparedness has actually been carried out in the eastern districts. Due to this reason, the southwester districts such as Bagerhat and Barisal received less concentration and remained less prepared to face future cyclones. This has been widely demonstrated during the cyclone Sidr and Aila.

Considering these change factors as well as the societal vulnerability issues (e.g. shrimp cultivation, scarcity of safe drinking water), Bagerhat district can be recommended to be included for cyclone/storm surge early warning pilot testing.

Bagerhat also includes the Mongla port area which has an added regional economic value. A matrix outlined in the section 7.3 can be used to further targeting and selection of communities for pilot testing within that district.



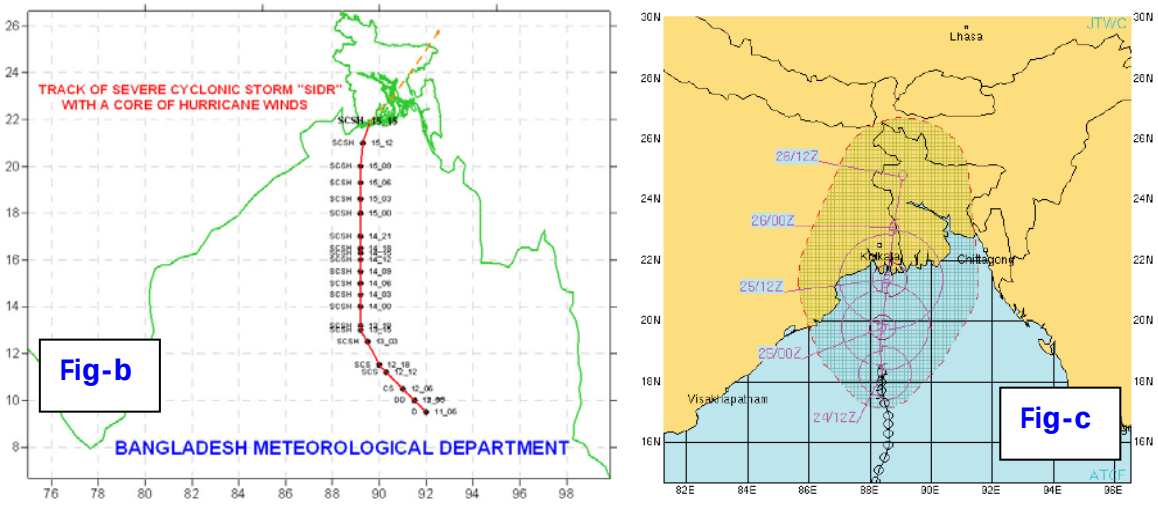


Figure 7-2. Recent tracks of cyclone in Bangladesh coast. A) shows recent tracks upto 2007 (source: IWM), b) Cyclone SIDR (Source: BMD), cyclone Aila track (Source: JTWC).

Recommendations for "cyclone/storm surge" related piloting:

- For this type of piloting, the DMIN Design-1 (Chapter 6, figure 6-1) is recommended for testing. For packaging of information and messaging, the CPP structure is recommended where CPP is well functioning (please see chapter three for the CPP and the KU-LDRRF approach).

- But in locations where CPP is not operational, the KU-LDRRF packaging systems can be adopted or promoted for piloting. In both cases, it is recommended that during piloting an active/operational network be promoted with the central DMIC as well as the district level DMIC.

- For selection of pilot communities it is recommended that the recent pattern of cyclone/storm surge as well as the scientific analyses of historical tracks pointed out the Khulna division of the (Bagerhat falls into that region) Bangladesh coast has high likelihoods for cyclone/storm surge. Considering these issues, the Bagerhat district is recommended for selection.

- Strengthening of the Union Disaster Management Committee through the formation of the Union Early Warning Information Center (UEWIC) is also strongly recommended as part of UDMC.

- This is recommended that during the pilot testing a "pre-planning" for early warning dissemination should be pre-set prior the event. The local level UEWIC should be sensitized prior the pilot testing stage and make effective during the mock-drill/simulation in the community.

- It is recommended that during the pilot testing community based early warning system is collaborated with the local government departments (such as DAE, Department of Health, Department of Education, Department of Livestock and other departments) are being made.

- It is recommended that the CPP, local administration and other civil society representatives are collaborated during the piloting stage in a participatory manner.

7.6 Pilot testing for "river bank erosion"

The CLIFMA findings revealed that Sirajganj district has a major vulnerability towards riverbank erosion along the western bank of the Brahmaputra-Jamuna River. At this point, BWDB with CEGIS (under JMREMP project) has initiated a process of erosion prediction in Sirajgon and Bogra districts along the Brahmaputra-Jamuna west bank. The recent prediction for year 2009 has suggested that various locations of both the sirajgonj and Gaibandha districts are vulnerable to river bank erosion in current year. In the following two figures (in figure 7-3) vulnerability prediction results published by BWDB shows that both the Shahjadpur upazila of Sirajgonj and Fulchhari upazila of Gainadha districts have high level of vulnerability in current year.

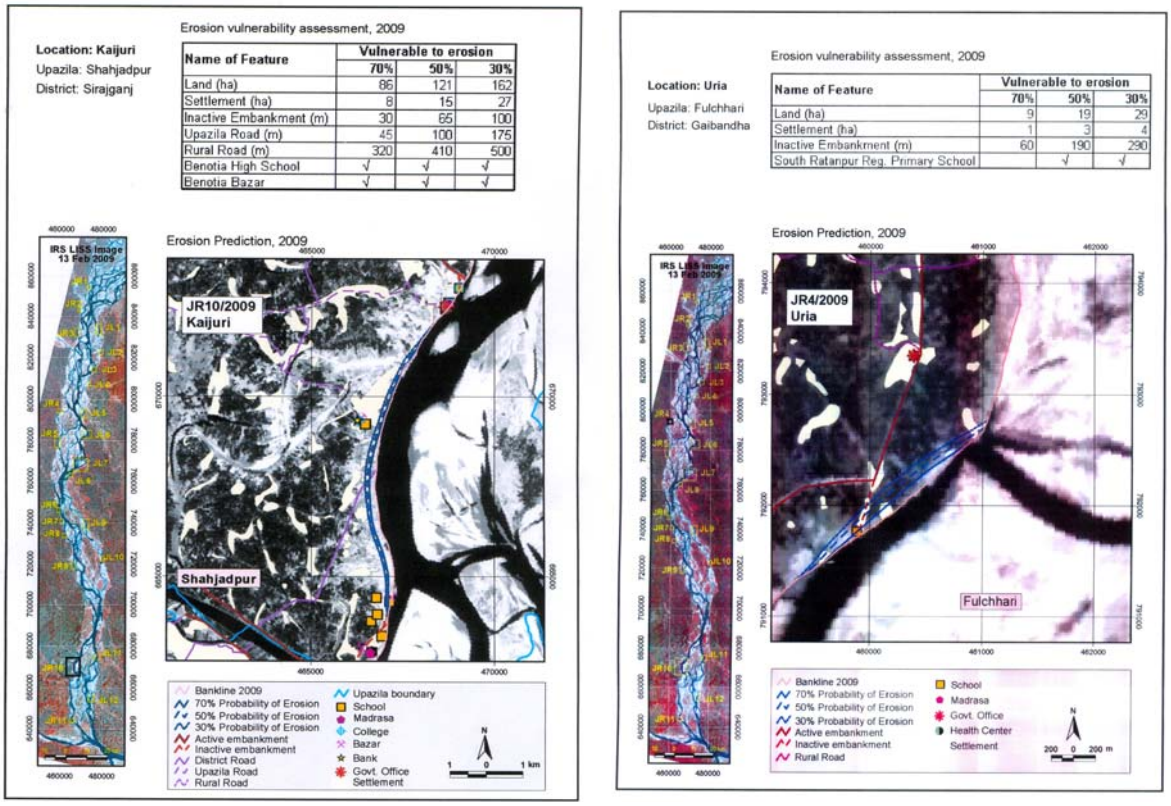


Figure 7-3. Erosion vulnerability maps -2009 published by BWDB for Kaijuri and Uria upazilas.

Local communities for pilot testing thereby can be selected on the basis of the above mentioned data as well as with an active consultation with the local agencies, NGOs, UPs and respective departments in these districts. The matrix outlined in the section 7.3 is a suggested matrix for finalizing the selection of the communities for pilot testing.

Recommendations for "river bank erosion" related piloting:

- It is recommended that for pilot testing of the riverbank erosion the proposed modalities and prediction results of the BWDB-JMREMP initiative (predictions 2009) is included in the pilot testing.

- From the recent most river bank erosion vulnerability prediction results both the Shahjadpur upazila of Sirajgonj and Fulchhari upazila of Gaibandha districts are shown as highly vulnerable locations. This is recommended that in selecting the communities for pilot testing these two upazilas are taken into consideration. Communities from these two districts are also studied during the CLIFMA field investigations.

- For this type of piloting, the DMIN proposed Design-2 (Chapter 6, Figure 6-2) is recommended for testing. For packaging of information and messaging, the BWDB-CEGIS-JMREMP modalities can be adopted (please see chapter three for details of the BWDB-CEGIS-JMREMP erosion prediction approach).

- It is also recommended that during piloting, an active/operational network be promoted with the central DMIC as well as with the district level DMIC in a dynamic manner.

- It is recommended that during the pilot testing activities are collaborated with the local government departments (such as DAE, Department of Health, Department of Education, Department of Livestock and other departments) are being made.

- Strengthening of the Union Disaster Management Committee through the formation of the Union Early Warning Information Center (UEWIC) is also strongly recommended as part of UDMC.

- The "pre-planning" for early warning dissemination issue that was discussed earlier should also be considered for this riverbank erosion pilot testing.

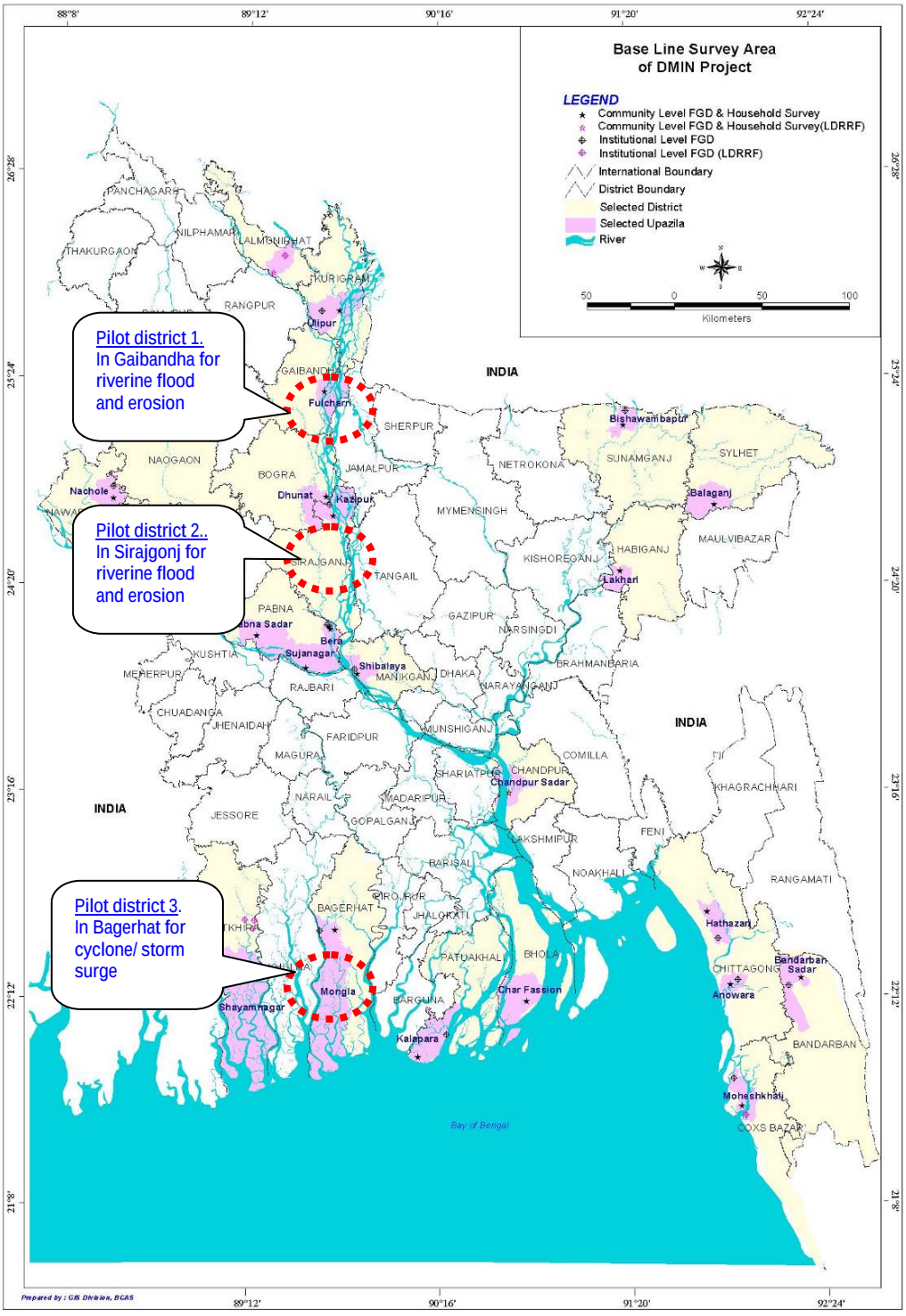


Figure 7-4. Thee recommended districts for piloting for cyclone, riverine flood and river bank erosion are shown in the map.

7.7 Pilot testing activities

The key objective of the three hazard-specific piloting exercises (cyclone, riverine flood and riverbank erosion) is to test the proposed DMIN design on how it functions at the local level from upazila down to household level. However, in this process, networking with the national level early warning source agencies (i.e. BMD, FFWC and DMIC) are also included to see the end-to-end connectivity, it's rapidness, efficiency, quality and sustainability of the early warning system. In this context, under the proposed piloting exercise following sequential activities can be planned. The activities are also shown in a schematic manner in the following diagram and detailed out below.

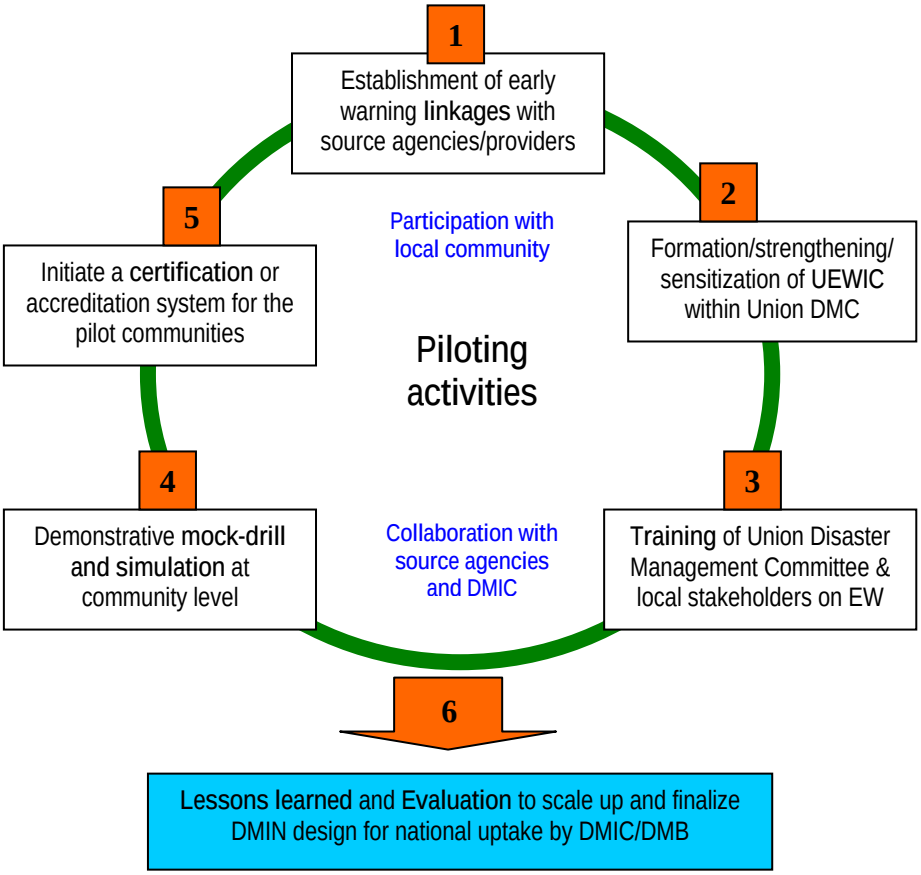


Figure 7-5. Planned piloting activities.

Step 1. Establishment of early warning linkages with source agencies/providers:

Following the proposed DMIN designs, an end-to-end source to local level linkage will be established. From national level linkages with BMD, FFWC and DMIC will be established. DMIC information materials will be directly linked with the upazila and union systems. The team will make necessary coordination with these national sources agencies for setting up this pilot testing at ground. The opportunities for newly developed collaboration between CDMP and cell phone companies can also be tapped for creating such networks under the piloting.

Step 2. Strengthening/sensitization of the Union Early Warning Information Center (UEWIC):

a) Formation/strengthening of EW groups within the Union DMC: CLIFMA study (as well as other existing initiatives) has recommended that a union level early warning entity is deemed necessary for community level early warning information flow and

dissemination. In this respect, the proposed pilot initiative will test a viable institutional "Union Early Warning Information Centers" (UEWIC). This is to be mentioned that the UEWIC is actually proposed as a pilot tested entity to make functional under the existing UDMC and with limited institutional re-vitalization bringing a new role within the existing UDMC structure. This could be named as the "Union Early Warning Information Centers" (UEWIC). Proposed entity is not a new institutional entity and rather a re-vitalization initiative to activate the UDMCs a bit further for early warning issues. This is just a new institutional sensitization/vitalization to activate EW issues within the existing institutional setup of UDMC. These UEWICs can be facilitated through minimum support for enhancing capacity for receiving and dissemination of EW information. No technologically heavy or 'resource hungry' protocols or equipment will be used considering the issue of future sustainability. The UEWICs can be setup in Union Parishad under UDMC. Several members of Union Parishad can be selected for operating the centre on a rotative manner.

b) Develop a list of early warning focal points from union to upazila and then link it with the source: A field visit will be carried out in the selected communities to make a list of people to be involved in mock exercises. People from the Upazila Office and Union Parishad will be involved in this process. Local NGOs and CPP will also be an integral part of the process. At the community level, Imams, school teachers, and members of Hat Bazar committees will also be involved in this process.

Step 3. Training of Union Disaster Management Committee and local focal persons on EW:
Some training materials (mostly presentation based materials) will be prepared to train representatives of UDMC and other relevant stakeholders for building capacity on early warning flow, dissemination and their role clarification. The training will provide them information about their roles and responsibilities for receiving and disseminating early warning information focusing in the proposed EW dissemination process.

Step 4. Demonstrative mock-drill and simulation at the community level:
The project staff and disaster managers of the individual nodes of the system will be put in place as part of a well-organized mock exercise. The mock drill is a tool for conceptualizing the activities as well as for 'role identification and awareness of people at critical disaster periods. The main objectives of the mock drill are to observe how the system functions, look into any deviations, identify where to improve, and finally, to tally the acceptance of the system to the community.

Step 5. Evaluation of the process and update the DMIN accordingly:
The project is going to pilot the proposed EW model through a mock exercise. After piloting the model, its gaps and weaknesses will be identified. Suggestions and recommendations will be sought out from experts and relevant stakeholders through the evaluation process and will be incorporated for finalizing the proposed model. A suggested matrix for evaluating the various layers of effectiveness during the mock exercise and piloting can look like below:

Step 6. Initiate a certification or accreditation system for the pilot communities:
Upon successful testing of the community level administration of DMIN down to the household level, the pilot communities can be accredited as "disaster information resilient communities". This process can be replicated into other communities, and when these other communities meet the standards of the DMIN design they can also be accredited by DMB and DMIC as disaster information resilient community. The process can continue in this line in a sustainable manner.

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Annexes

Annex 1a. Household survey questionnaires (English & Bangla)

Design, Test and Demonstrate a DMIN Down to Household Level (CDMP5b1)
Community Level Information Flow Mapping Assessment

Questionnaire No.

Household Survey Questionnaire – Dec, 2008

Part A. Survey administration related Information

Name of respondent:		
Male/Female	District:	Upazila:
Date of interview:	Union:	Name of study village:

Part B. Demographic and socio-economic information of the household

SL No.	Name of the household member	Relationship with household head	Sex (M/F)	Age (Year)	Earning status (use ✓)		Occupation		Education
					Earning member	Non-earning member	Primary	Secondary	
1.		1 (Self)							
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									

Relationship codes: 1=self, 2=Wife, 3=Husband, 4=Son, 5=Daughter, 6=Father, 7=Mother, 8=Daughter in law, 9=Son in law, 10=Brother, 11=Sister, 12=Father in law, 13=Mother in law, 14=Nephew, 15=Grandfather, 16=Grandmother, 99- Others (please specify…..).

Occupation codes: 1-Govt. employment, 2-Private employment, 3-Trading, 4-Cultivate own land, 5-Sharecropper, 6-Rent out land, 7-Agricultural wage labour, 8-Non-agricultural wage labour, 9-Aquaculture, 10-Open water fisher, 11-Household work, 12-Student, 13-Unemployed, 14-Rickshaw/Van puller, 15-Boatman, 16-Cottage industry, 17-Househelper/housemaid, 18-Dependent, 99- Others (please specify…).

Education codes: 0=Child/Infant; 1-Illiterate, 2-Non formal literacy, 3-Up to class 5, 4-class 6 to 10, 5- S.S.C. or equivalent, 6- H.S.C. or equivalent, 7-Bachelor's degree or equivalent, 8-Master's degree or equivalent or above.

B.1 Identify your household category: *(please use ✓ in one box)*

Always deficit	Occasionally deficit	Break even	Well off

B.2 Household's gross annual income and expenditure (in Taka):

Annual Income	<10,000	10,000-15,000	15,001-20,000	20,001-25,000	25,001-30,000	30,001-40,000	40,001-50,000	50,001-60,000	60,001-70,000	70,001-80,000	80,001-90,000	90,001-100,000	100,00-150,000	150,000+

Annual Expenditure	<10,000	10,000-15,000	15,001-20,000	20,001-25,000	25,001-30,000	30,001-40,000	40,001-50,000	50,001-60,000	60,001-70,000	70,001-80,000	80,001-90,000	90,001-100,000	100,00-150,000	150,000+

B3. Land ownership and holding of the household *(Please use ✓ in one box and write amount of landholding in decimal):*

Owned area	Operated area	Others (if any)	Total land holding of the household *(in decimal)*

Part C. Hazard composition

C1. Please indicate the most dominant hazard in your locality in past ten years? *(please use respective codes)*

	Primary hazards		Secondary hazards		
	1	2	3	4	5
Most dominant Hazard *(please use hazard code)*					
Year of disasters of that hazard *(please mention years)*					
Frequency of occurrences of that hazard in the area *(please use frequency code)*					
Severity of that hazard in the area *(please use severity code)*					
Impact of that hazard in the area *(please use impact code)*					

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

Frequency code: 1-Very Low, 2-Low, 3-Medium, 4-High, 5-Very High

Severity code: 1-Very Low, 2-Low, 3-Medium, 4-High, 5-Very High

Impact code: 1-Very Low, 2-Low, 3-Medium, 4-High, 5-Very High

C2. Please identify what kind of damage your household experienced in past years?

(Please tick in one box only in each row)

	Partly	Fully
Human life		
Household assets *(e.g. house, jewellery, cash, domestic items)*		
Livelihoods assets *(e.g. agri equipment, livestock etc.)*		
Crops/catch/production		
Unemployment		
Others (please specify……..……)		

Part D. Status of Existing Early Warning Systems

D1. How do you perceive "early warning": *(please specify in your own terms)*

D2. Do you think early warning information will help your household?

(Please tick in one box only)

Yes	No

D3. Please identify what can be saved through early warning of your household?

(Please tick in one box only in each row)

	Partly	Fully
Human life		
Household assets *(e.g. house, jewellery, cash, domestic items)*		
Livelihoods assets *(e.g. agri equipment, livestock etc.)*		
Crops/catch/production		
Unemployment		
Others (please specify……..……)		

D4. What type of early warning do you rely on for preparedness in your locality?

(Please tick in one box only in respective row)

Hazard *(please use hazard code)*	Formal (govt. issued) warning system	Indigenous/local informal early warning	Both	None
For dominant hazards (general)				

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

D5. Please indicate in what situation your household reacts to the early warning? *(please use ✓ in one box only)*

When someone dies in the community	When people observe some damage to properties	When hazard arrives in the area	In case of panic situation only/ officials put enforcement	When information is widely spread in among community and others start acting	Whenever EWI is heard
0	1	2	3	4	5

D6. Please indicate your responses on availability for any dominant hazard in your locality?

Hazard *(please use hazard code)*	Do you receive any EW information in your locality? *(please tick one in each row)*		Type of early warning information you receive *(please use Type code)* *Note: Answer could be multiple*	Frequency of early warning information *(please use frequency code)*	Existing Lead- time you get *(please use the lead-code)*	Efficacy of the early warning information you receive *(please use efficacy code)*
	Yes	No				
For dominant hazards (general)						

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

Frequency code: 0=Hourly daily (during hazard time); 1=Twice daily, 2=Once in a day/daily, 3=Event based; 4=Seasonally, 5=Annually

Type of EW information code: 1=Verbal warning from agencies/UP; 2=Special Bulletin (special bulletin); 3=Weather information/ News; 4=Seasonal Outlook; 5=Annual Plan/Outlook; 6=Electronic Media news/commentaries (TV/Radio); 7=Print media news/commentaries; 99=Others (please specify..)

Lead time code: 1=2 hours, 2=4-6 hours; 3=6-12 hours; 4=12-24 hours; 5=2-5 days; 6=5-10 days; 7=Monthly; 8=Seasonally (3 months); 9=Annually

Efficacy code: 0=Not effective at all; 1=Very low efficacy; 2=Low efficacy, 3=Medium efficacy; 4=High efficacy; 5=Very high efficacy

D7. Please indicate the source(s) of early warning information:

Hazard *(please use hazard code)*	Your existing source(s) of regular early warning information *(please use information source code)* *Note: Answer could be multiple*	Your preferred source(s) of early warning information *(please use information source code)* *Note: Answer could be multiple*
For dominant hazards (general)		

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

Information Source code: 1= Union Parisad representatives; 2=UDMC representatives; 3 =Radio; 4=TV, 5=Newspaper; 6= Neighbour/relative; 7=Mosque/Temple; 8=Bazar/*haat*, 9=*Choukidar*/*dafadar*; 10=Red Crescent; 11=School/Madrasa; 12=UNO office; 13= Government departments; 14=NGO; 15=Purashava/ward; 99=Others (please specify……..……)

D8. What is the lead-time you need/prefer to prepare for your life, assets and livelihoods?
(*please use preparedness code in respective time column by hazard)*

Hazard *(please use hazard code)*	Needed or preferred lead-time *(please use "preparedness category code" in respective boxes)*								
	2 hours	4-6 hours	6-12 hours	12-24 hours	2-5 days	5-10 days	Monthly	Seasonally (3 months)	Annually
For dominant hazards (general)									

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

Preparedness category code: 1- to save life; 2- to save household assets and tangible goods; 3- to save crops and livelihoods

D9. On what frequency do you share early warning information with others? *(please use ✓ in one box only)*

Never	If anyone shows interest then only	In case of own household's need only	Depending on the perceived severity of the hazard	In case of panic situation only	Share all the time as and when information is received
0	1	2	3	4	5

D10. What is your perceived level of accuracy of the early warning information that you receive? *(Please tick in one box only)*

Never been accurate at all	☐
Accuracy level around 20%	☐
Accuracy level around 40%	☐
Accuracy level around 60%	☐
Accuracy level around 80%	☐
Always accurate (100%)	☐

D11. What is the level of trust your household has on the existing early warning information? *(Please tick in one box only)*

No trust at all	☐
Very low trust (~20%)	☐
Low trust (~40%)	☐
Medium trust (~60%)	☐
High (~80%)	☐
Full trust (100%)	☐

D12. Whenever you hear any early warning do you try to validate that information from others? *(Please tick in one box only)*

Never validate	☐
Validate 25% of the time	☐
Validate 50% of the time	☐
Validate 75% of the time	☐
Validate always 100% of the time	☐

D13. Please provide your response to dissemination and related issues of early warning information:

Hazard	Existing EW information dissemination mode *(please use dissemination mode code)* *Note: Answer could be multiple*	Area Coverage *(please use coverage area code)*					Quality *(please use quality code)*	Efficacy *(please use efficacy code)*
		20 %	40 %	60 %	80 %	100%		
For dominant hazards (general)								

Dissemination mode code: 1=Orally door to door; 2=Miking/Orally road to road; 3=Megaphone; 4=Radio/TV; 5=Newspaper; 6=*Dhol/Shorod/Singa*; 7= Telephone; 8=Mobile phone; 9=Fax; 10=Telegraph; 11=Mosque mike/Temple bell; 12=Official letter; 13=Public meeting; 14= Flag hoisting; 15=Siren; 16=Light; 17=Electronic notice board; 18=Community/Market-place notice board; 19=Mobile phone SMS; 20=Internet based website; 21= Through local govt. representative (members/chairman); 22= Through government department officials; 23=Through NGOs and civil society agencies; 99=Others (please specify)

Quality code: 1=Bad; 2=Moderate; 3=Good

Efficacy code: 0=Not effective at all,; 1=Very low efficacy; 2=Low efficacy, 3=Medium efficacy; 4=High efficacy; 5=Very high efficacy

D14. Information on content of early warning message received by your household:

Hazard *(please use hazard code)*	Type of message received *(please use message type code)*	Message content status *(please ✓in any one box in each row)*			Your level of understanding of the EW message/bulletin *(please ✓in any one box in each row)*			
		Timing (when its coming)	Intensity (how big is the hazard)	Duration (how long it will continue)	No understanding at all	Low level of understanding	Medium level of understanding	High level of understanding
For dominant hazards (general)								

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

Message type code: 1=Verbal warning from agencies/UP; 2=Special Bulletin (special bulletin); 3=Weather information/ News; 4=Seasonal Outlook; 5=Annual Plan/Outlook; 6=Electronic Media news/commentaries (TV/Radio); 7=Print media news/commentaries; 99=Others (please specify..)

D15. What is your household's preferred dissemination mode?

Hazards *(please use hazard code)*	Preferred dissemination mode *(please use dissemination mode code)*		
	Day time	Night time	For people of special needs and disability
For dominant hazards (general)			

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

Dissemination mode code: 1=Orally door to door; 2=Miking; 3=Megaphone; 4=Radio/TV; 5=News paper; 6=*Dhol/Shorod/Singa*; 7= Telephone; 8=Mobile phone; 9=Fax; 10=Telegraph; 11=Mosque mike/Temple bell; 12=Official letter; 13=Public meeting; 14= Flag hoisting; 15=Siren; 16=Light; 17=Electronic

notice board; 18=Mobile phone SMS; 19=Internet based website; 20= Through local govt. representative (members/chairman); 21= Through government department officials; 22=Through NGOs and civil society agencies; 99=Others (please specify)

D16. What kind of communication system(s) your household has access to? *(please use ✓in respective boxes, answer could be multiple)*

- ☐ Radio
- ☐ TV (national channels)
- ☐ TV (international channels)
- ☐ Land Telephone
- ☐ Mobile/Cell phone
- ☐ Others (please specify)
- ☐ Fax
- ☐ Wireless/Walkie Takie
- ☐ Newspaper
- ☐ HF/VHF Radio
- ☐ Handheld PC/PDA
- ☐ VCR-VCD/DVD/Movie theatre
- ☐ Mike
- ☐ Megaphone
- ☐ Mail/Courier services
- ☐ Internet/web/email

D17. Do you use any indigenous/local knowledge for early warning?*(Please ✓in one box only)*

Never	Daily	Seasonally	Inter-annually	On event

If you use any indigenous/local knowledge for early warning then please indicate:

Indigenous/local knowledge *(please use codes)*	Useful for which hazard? *(please use hazard code)*	Efficacy level *(please use efficacy code)*

Indigenous/local knowledge code: 1=Watching the cloud behavior; 2=Track speed and direction of wind; 3=Monitor river water heights; 4=Tracking the monsoon months/weeks; 5=Observe the lunar position of the moon; 6=Observe animal behavior; 7=Observe insect behavior; 8= Observe wave/current; 9= Observe the characteristics of sun; 10= Observe amount sediment in water/river/sea; 11=Observe the temperature; 99=Others (please specify)

Hazard Code: 1=Cyclone/Storm surge; 2=Riverine flood; 3=Urban flood; 4=Flash flood; 5=River bank erosion; 6=Drought; 7=Tornado; 8=Landslide; 9=Nor'wester (*kalboishakhi*); 10=Tsunami; 11=Earthquake; 12=Fire; 99=Others (please specify)

Efficacy code: 0-Not effective at all, 1-Very low efficacy 2-Low efficacy, 3-Mediumv efficacy, 4-High efficacy, 5-Very high efficacy

D18.Which institution do you think is the most trusted and most effective for sharing early warning information in your community (down to upazila level only)? *(please rank the most preferred one in higher scores e,g, higher the rank will be lower the score)*

	Most accessible agency	Most trusted agency	Most effective
Upazila Administration (UNO office)			
Disaster Management Committees (UzDMC and UDMC)			
Elected Union Council (UP)			
Local NGOs (respective district)			
National NGOs			
Red Cross/Red Crescent			
Educational institutes (schools, colleges)			
Haat/Bazar Committees			
Police station (*thana*)			
Others (please specify……..…)			

D19. What activities do you carry out after receiving early warning information? *(use ✓in appropriate boxes, answer could be multiple).*

- ☐ Do noting
- ☐ Move to safer locations
- ☐ Organize/arrange household and livelihoods assets/crops
- ☐ Wait for external assistance
- ☐ Others (please specify)
- ☐ Discus and validate information from the community (haat/bazaar etc.)
- ☐ Discus and validate information from the family and friends
- ☐ Discuss things within the household
- ☐ Check information with the UP representatives

D20. If you are able to receive early warning information/messages with enough lead-time do you have sufficient response options for preparedness (e.g. evacuation for cyclone etc.) *(please use ✓in one box only)*

Do not have enough options	Very little options	Some options	Good options	Near sufficient options	Sufficient options
0	1	2	3	4	5

D21. Please rank which factors are contributing more in the early warning gap(s) at your community?
(please rank the most negative contributory factor as 1)

Uncertainty and consistency early warning information	Trust and experience on the early warning information	Early warning dissemination	Understandability and interpretation factors	Response factors	Local level capacity factors

D22. What is your level of willingness to pay for early warning information in your community? *(please use ✓in one box only)*

Not willing to pay in any case	Government should pay	Willing to share cost with government (minimal share from the community)	Willing to pay to the community fund (if it helps to save lives)	Willing to pay to the community fund (if helps to save livelihoods assets (crop production/catch)	Willing to pay from household
0	1	2	3	4	5

D23. Please identify the relative level of access to early warning information within the community: *(please use ✓in respective boxes, Answer could be multiple)*

	Men	Women	Elderly	Children
Formal hazard early warning				
Weather information through TV/Radio				
Court-yard meetings on early warning/awareness issues				
Public meeting on early warning in public places (haat/bazaar)				
Radio				
Television news				
Internet/website/email based communication				
Others (please specify)				

D24. Please identify the factors that are barriers to in community level early warning efficacy:
(please use ✓in respective boxes, Note: answer could be multiple)

Uncertainty and inconsistency factors:

- ☐ Unavailability of warning information
- ☐ Insufficient (or unusable) messages content
- ☐ Uncertainty in detecting hazard (timing, geographical location, intensity etc.)
- ☐ Un-timely availability of the warning information
- ☐ False alarms and warnings
- ☐ Continuation of follow up of the warning after the initial message received

Trust and experience factors:

- ☐ Lack of trust into the existing system
- ☐ People are not habituated to use warning information
- ☐ People do not take warning seriously

Early warning dissemination factors:

- ☐ Dissemination from national level
- ☐ Dissemination from upazila offices
- ☐ Dissemination of warning messages at community level

Understandability and interpretation factors:

- ☐ Lack of understanding of the early warning message
- ☐ Fail to interpret warning information into potential impacts
- ☐ Consistency of the warning level (sudden jump to another category)

Response factors:

- ☐ People wait for the worst time and intensity of the hazard
- ☐ People's reliance on fate (fatalistic attitude)
- ☐ Lack of availability of response options at ground level (e.g. safe haven capacity)

Local level capacity factors:

- ☐ Unavailability of warning dissemination equipments
- ☐ Lack of local institutions for regular warning
- ☐ Lack of trained human resources to disseminate/interpret the technical early warning information

☐ Others (please specify)

D25. What can be done (suggestions) to improve further or strengthen the EW system in your community?

1)……..
2)……..
3)……..
4)……..

D26. What do you suggest for sustainability (and initiatives can be taken) of the EW system at community level?

1)……..
2)……..
3)……..
4)……..

Signature of survey enumerator (after Completion)	Signature of researcher (after checking)

Bangla version of the Household Survey Questionnaire

প্রশ্নপত্র নং-

Design, Test and Demonstrate a DMIN Down to Household Level (CDMP5b1)
Community Level Information Flow Mapping Assessment
খানা জরিপ প্রশ্নমালা- নভেম্বর ২০০৮

১ম অংশ: উত্তরদাতার পরিচিতি ও জরিপ সংক্রান্ত তথ্য

উত্তরদাতার নাম		
পুরুষ/মহিলা:	জেলা:	উপজেলা:
জরিপের তারিখ:	ইউনিয়ন:	গ্রাম:

২য় অংশ: খানার জনমিতিক ও আর্থসামাজিক তথ্য:

ক্রমিকনং	পরিবারের সদস্যদের নাম	পরিবার প্রধানের সাথে সম্পর্ক	লিঙ্গ (পুরুষ/ মহিলা)	বয়স (বছর)	আয়ের অবস্থা (√) দিন		পেশা		শিক্ষা
					উপার্জনক্ষম সদস্য	অনুপার্জনক্ষম সদস্য	প্রাথমিক	মাধ্যমিক	
১		১(নিজে)							
২									
৩									
৪									
৫									
৬									
৭									
৮									
৯									
১০									
১১									
১২									

* **সম্পর্ক কোড:** ১- নিজ, ২- স্ত্রী, ৩- স্বামী, ৪- পুত্র, ৫- কন্যা, ৬- পিতা, ৭- মাতা, ৮- পুত্রবধূ, ৯- জামাই, ১০- ভাই, ১১- বোন, ১২- শ্বশুর, ১৩- শ্বাশুড়ী, ১৪- ভাতিজা, ১৫- পিতামহ/দাদা, ১৬- পিতামহী/দাদি, ৯৯- অন্যান্য (নির্দিষ্ট করুন)।

** **পেশা কোড:** ১- সরকারী চাকুরী, ২- বেসরকারী প্রতিষ্ঠান, ৩- ব্যবসা, ৪- নিজ জমি চাষী, ৫- বর্গাচাষী, ৬- বন্ধকী জমি চাষ, ৭- কৃষিজীবি মজুর, ৮- অকৃষিজীবি মজুর, ৯- মৎসচাষী, ১০- জেলে, ১১- গৃহস্থালীর কাজ, ১২- ছাত্র, ১৩- বেকার, ১৪- রিক্সা/ভ্যান চালক, ১৫- মাঝি, ১৬- কুটির শিল্প, ১৭- গৃহপরিচারক/ চারিকা, ১৮- নির্ভরশীল, ৯৯- অন্যান্য (নির্দিষ্ট করুন)।

*** **শিক্ষা কোড:** ০- শিশু/বৃদ্ধা/বৃদ্ধ, ১-নিরক্ষর, ২-উপানুষ্ঠানিক শিক্ষা, ৩- পঞ্চম শ্রেণী পর্যন্ত, ৪- মাধ্যমিক, ৫- এসএসসি/সমমান, ৬- উচ্চ মাধ্যমিক/ সমমান, ৭- স্নাতক/সমমান, ৮- স্নাতকোত্তর/সমমান

২.১ আপনার খানার সার্বিক অবস্থা নির্দিষ্ট করুন (বক্সে √ চিহ্ন দিন)

সর্বদাই ঘাটতি	সাময়িক ঘাটতি	আয় ব্যয় সমান	স্বচ্ছল

২.২ পারিবারের বার্ষিক আয় এবং ব্যয় (টাকায়)

বার্ষিক আয়	<১০,০০০	১০,০০০-১৫,০০০	১৫,০০১-২০,০০০	২০,০০১-২৫,০০০	২৫,০০১-৩০,০০০	৩০,০০১-৪০,০০০	৪০,০০১-৫০,০০০	৫০,০০১-৬০,০০০	৬০,০০১-৭০,০০০	৭০,০০১-৮০,০০০	৮০,০০১-৯০,০০০	৯০,০০১-১০০,০০০	১০০,০০-১৫০,০০০	১৫০,০০০+

বার্ষিক ব্যয়	<১০,০০০	১০,০০০-১৫,০০০	১৫,০০১-২০,০০০	২০,০০১-২৫,০০০	২৫,০০১-৩০,০০০	৩০,০০১-৪০,০০০	৪০,০০১-৫০,০০০	৫০,০০১-৬০,০০০	৬০,০০১-৭০,০০০	৭০,০০১-৮০,০০০	৮০,০০১-৯০,০০০	৯০,০০১-১০০,০০০	১০০,০০-১৫০,০০০	১৫০,০০০+

২.৩ মালিকানা ও আওতাধীন জমির বিবরন (নির্দিষ্ট বক্সে জমির পরিমান ডেসিমালে লিখুন)

নিজস্ব জমি	আওতাধীন	অন্যান্য (নির্দিষ্ট করুন)	উক্ত খানার মোট জমি (ডিসিমালে)

৩. প্রাকৃতিক দুর্যোগের ধরণ ও প্রস্তুতি:

৩.১ গত দশ বছরে আপনার এলাকায় সবচেয়ে প্রকট আপদগুলো উল্লেখ করুন? (আপদ কোড ব্যবহার করুন)

আপদ সম্পর্কিত তথ্য	মুখ্য আপদ		গৌণ আপদ		
	১	২	৩	৪	৫
সবচেয়ে প্রকট আপদ*					
আপদটি সংঘটিত হওয়ার সাল/সালসমুহ					
আপদের পৌনঃপুনিকতা**					
অত্র এলাকায় আপদের তীব্রতা**					
অত্র এলাকায় আপদের প্রভাব**					

*আপদ কোডঃ ১- ঘূর্নিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩- নগর বন্যা, ৪- আকস্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা,৭- টর্নেডো, ৮- ভূমিধ্বস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকান্ড, ১৩- অন্যান্য (নির্দিষ্ট করুন)।

**পৌনঃপুনিকতার মাত্রা, তীব্রতা ও প্রভাব মাত্রার কোডঃ ১- খুব কম, ২- কম, ৩- মাঝারি, ৪- বেশি, ৫- খুব বেশি

৩.২ বিগত আপদে আপনার গৃহস্থালী কি কি ধরনের ক্ষয়ক্ষতির সম্মুখীন হয়েছেন? (প্রতি সারির জন্য একটি √ দিন)

	আংশিক	সম্পূর্ন
মানব জীবন		
গৃহস্থ সম্পদ (ঘর, গহনা, টাকা ইত্যাদি)		
জীবীকায়ন সম্পর্কিত সম্পদ (কৃষি যন্ত্রাংশ,গবাদিপশু)		
মাছধরা, শস্য উৎপাদন		
কর্মসংস্থান		
অন্যান্য (নির্দিষ্ট করুন)		

৪র্থ অংশ: আপদের পুর্বসতর্কীকরনের বর্তমান অবস্থা

৪.১ আগাম সতর্কবার্তা/পূর্বাভাসকে আপনাদের ভাষায় কি বলেন?

৪.২ আপনি কি মনে করেন দুর্যোগের আগাম সতর্কতা/পূর্বাভাসের তথ্য আপনার পরিবারের জন্য উপকারী ? (একটি বক্সে √ দিন)

☐ হ্যাঁ ☐ না

৪.৩ আগাম সতর্কবার্তা/পূর্বাভাস আপনার পরিবারের কি কি সম্পদ রক্ষায় ভূমিকা রাখতে পারে?

	আংশিক	সম্পূর্ন
মানব জীবন		
গৃহস্থালীয় সম্পদ		
জীবন/জীবিকার সাথে সংশিষ্ট সম্পদ (গবাদি পশু, কৃষি যন্ত্রপাতি)		
শষ্য/কৃষিক্ষেত		
কর্মসংস্থানজনিত		
অন্যান্য (নির্দিষ্ট করুন)		

৪.৪ আপনার পরিবার কোন ধরনের আগাম সতর্কবার্তা/পূর্বাভাসের উপর নির্ভর করে কিনা ? (সংশ্লিষ্ট আপদের সারিতে একটি বক্সে √ দিন)

বিপদ	প্রাতিষ্ঠানিক (সরকারী ব্যবস্থাপনায়) আগাম সতর্কতা ব্যবস্থা	স্থানীয়/লোকজ সতর্কতা ব্যবস্থা	উভয়টির উপর	কোনটিই নয়
প্রধান প্রধান আপদ গুলোর জন্য				

*আপদ কোডঃ ১- ঘূর্নিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩- নগর বন্যা, ৪- আকস্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা, ৭- টর্নেডো, ৮- ভূমিধ্বস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকান্ড, ১৩- অন্যান্য (নির্দিষ্ট করুন)।

৪.৫ কি ধরনের পরিস্থিতি তৈরি হলে আপনি আগাম সতর্কবার্তা/পূর্বাভাসে সাড়া দিয়ে থাকেন? (একটিমাত্র বাক্সে √ দিন)

যখন আশপাশে কেউ আপদেমারা যায়	যখন সম্পদের কিছুটা ক্ষতি সাধিত হয়	যখন আপদ কাছাকাছি চলে আসে	যখন চারদিকে আতঙ্ক সৃষ্টি হয়	যখন সতর্কবার্তা এলাকায় পৌছে যায় এবং আশপাশের লোকজন নিরাপদ আশ্রয়ে যেতে শুরু করে	আগাম সতর্কতা সংকেত পাবার সাথে সাথেই
০	১	২	৩	৪	৫

৪.৬ আপনার এলাকায় আপদের আগাম সতর্কবার্তা/পূর্বাভাস নিয়ে নিম্নবর্তী বিষয়ে আপনার মতামত দিন।

আপদের নাম *	আপনার এলাকায় প্রাকৃতিক দুর্যোগের পূর্বে কোন আগাম সতর্কবার্তা পান কি? (√ দিন)		কোন ধরনের সতর্কবার্তা পান? (টাইপ কোড ব্যবহার করুন) (উত্তর একাধিক হতে পারে)	আগাম সতর্কবার্তা কতবার পান? (পৌনঃপুনিকতার মাত্রা কোড ব্যবহার করুন)	দুর্যোগের কত সময় আগে সংকেত বার্তা পান (লিড টাইম কোড ব্যবহার করুন)	আগাম সতর্কবার্তা কতটা কার্যকর (কার্যকারীতার কোড ব্যবহার করুন)
	হ্যাঁ	না				

*আপদ কোডঃ ১- ঘূর্নিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩- নগর বন্যা, ৪- আকস্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা, ৭-টর্নেডো, ৮- ভূমিধ্বস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকান্ড, ১৩- অন্যান্য (নির্দিষ্ট করুন)।

পৌনঃপুনিকতার মাত্রাঃ০- প্রতি ঘন্টায় (আপদকালীন সময়) ১- দিনে দুইবার, ২- দিনে একবার, ৩- ঘটনার সময়, ৪- ঋতু ভিত্তিক, ৫- বার্ষিক

আগাম সতর্কবার্তার কোডঃ১- ইউনিয়ন পরিষদ/সংস্থা হতে মৌখিক সতর্কতা, ২- বিশেষ বুলেটিন, ৩- আবহাওয়ার সংবাদ, ৪- ঋতু ভিত্তিক অনুমান, ৫- বার্ষিক পরিকল্পনা/অনুমান, ৬- ইলেকট্রনিক মিডিয়া/সংবাদ (টিভি, রেডিও), ৭- পত্রিকা/মতামত হতে ৯৯- অন্যান্য (নির্দিষ্ট করুন)

লিড টাইম কোডঃ১- ২ ঘন্টা, ২- ৪-৬ ঘন্টা, ৩- ৬-১২ ঘন্টা, ৪- ১২-২৪ ঘন্টা, ৫- ২-৫ দিন, ৬- ৫-১০ দিন, ৭- মাসিক, ৮- ঋতুভিত্তিক (৩ মাস অন্তর), ৯- বার্ষিক।

কার্যকারিতার কোডঃ ০- অকার্যকর, ১- খুব কম কার্যকর, ২- কম কার্যকর, ৩- মোটামুটি কার্যকর, ৪- খুব কার্যকর, ৫- খুব বেশি কার্যকর।

৪.৭ আগাম সতর্কতা মূলক তথ্যের উৎস চিহ্নিত করুন:

আপদের নাম	আপনার বর্তমান আগাম সতর্কবার্তার উৎস কি কি ? আগাম সতর্কবার্তার উৎসের কোড ব্যবহার করুন) (উত্তর একাধিক হতে পারে)	আপনার আগাম সতর্কবার্তার কোন কোন উৎস আপনার প্রয়োজন? আগাম সতর্কবার্তার উৎসের কোড ব্যবহার করুন) (উত্তর একাধিক হতে পারে)
সার্বিক প্রধান আপদগুলোর জন্য		

আপদ কোডঃ ১- ঘূর্নিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩- নগর বন্যা, ৪- আকস্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা, ৭- টর্নেডো, ৮- ভূমিধস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকান্ড, ১৩- অন্যান্য (নির্দিষ্ট করুন)।

তথ্য উৎসের কোডঃ ১- ইউনিয়ন পরিষদ, ২- UDMC, ৩- রেডিও, ৪- টিভি, ৫- সংবাদপত্র, ৬- প্রতিবেশি/আত্মীয়, ৭- মসজিদ, ৮- হাট/বাজার, ৯- চৌকিদার/দফাদার, ১০- রেড ক্রিসেন্ট, ১১- স্কুল, ১২- থানা নির্বাহী কর্মকর্তার অফিস, ১৩- সরকারী সংস্থা, ১৪- এনজিও, ১৫- পৌরসভা, ৯৯-অন্যান্য (নির্দিষ্ট করুন)।

৪.৮ দুর্যোগ মোকাবিলার প্রস্তুতির জন্য আপনার কত সময় পূর্বে আগাম সতর্কবার্তা/পূর্বাভাস পেলে ভাল হয় ? (দুর্যোগের ধরণ অনুসারে প্রস্তুতিমূলক ব্যবস্থা কোড ব্যবহার/ নির্দিষ্ট করুন।

আপদের নাম	সতর্কতামূলক ব্যবস্থা নেয়ার পছন্দ সই/ আবশ্যক সময় (নির্দিষ্ট ক্ষেত্রে প্রস্তুতি কোড ব্যবহার করুন)								
	২ ঘন্টা	৪-৬ ঘন্টা	৬-১১ ঘন্টা	১২-২৪ ঘন্টা	২-৫ দিন	৫-১০ দিন	মাসিক	ঋতু ভিত্তিক	বার্ষিক

আপদ কোডঃ ১- ঘূর্নিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩ - নগর বন্যা, ৪- আকস্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা, ৭- টর্নেডো, ৮- ভূমিধস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকান্ড, ১৩- অন্যান্য (নির্দিষ্ট করুন)।

প্রস্তুতি ক্যাটাগরী কোডঃ ১- জীবন রক্ষা, ২- গৃহস্থালীর সম্পদ ও মালামাল রক্ষা, ৩- জীবিকা ও শস্য/কৃষি ক্ষেত রক্ষা

৪.৯ আগাম সতর্কবার্তার প্রাপ্ত তথ্য আপনি কিভাবে অন্যদের সাথে বিনিময় করেছেন ? (শুধুমাত্র একটি কলামে √ দিন)

কখনোই না (০)	কেউ জানতে চাইলে (১)	শুধুমাত্র আমার পারিবারিক প্রয়োজন (২)	দুর্যোগের অনুমিত তীব্রতার উপর নির্ভর করে (৩)	শুধুমাত্র আতঙ্কিত অবস্থায় (৪)	যখনই তথ্য পেয়েছি বিনিময় করেছি (৫)

৪.১০ আপনার প্রাপ্ত আগাম সতর্কবার্তার যথার্থতা সম্পর্কে আপনার মতামত দিন ? (শুধুমাত্র একটি কলামে √ দিন)

কখনই সঠিক ছিল না	
যথার্থতার মাত্রা ২০% এর মধ্যে ছিল	
যথার্থতার মাত্রা ৪০% এর মধ্যে ছিল	
যথার্থতার মাত্রা ৬০% এর মধ্যে ছিল	
যথার্থতার মাত্রা ৮০% এর মধ্যে ছিল	
যথার্থতার মাত্রা ১০০% ছিল	

৪.১১ আপনার এলাকায় প্রাপ্ত আগাম সতর্কবার্তার উপর আপনার পরিবারের আস্থা সম্পর্কে মতামত দিন ? (শুধুমাত্র একটি কলামে √ দিন)

কোন আস্থা নেই	
অতি সামান্য আস্থা (২০%)	
সামান্য আস্থা (৪০%)	
মধ্যম আস্থা (৬০%)	
বেশভালো আস্থা (৮০%)	
পূর্ণ আস্থা (১০০%)	

৪.১২ আগাম সতর্কবার্তা পাবার পর আপনি তা অন্যদের সাথে কথা বলে যাচাই করেন কিনা? (শুধুমাত্র একটি কলামে √ দিন)

কখনই না ☐ ২৫% সময় করে থাকি ☐ ১০০% সময় করে থাকি ☐
৫০% সময় করে থাকি ☐ ৭৫% সময় করে থাকি ☐

৪.১৩ আগাম সতর্কবার্তার প্রচার এবং এর সাথে সম্পর্কিত বিষয়াবলী সম্পর্কে আপনার মতামত দিন?

আপদের নাম	আগাম সতর্কবার্তর বর্তমান প্রচার পদ্ধতি (প্রচার পদ্ধতি কোড ব্যবহার করুন)	সতর্কবার্তা প্রচারের বিস্তৃতি (সঠিক স্থানে √ দিন)					গুণগতমান (মান কোড ব্যবহার করুন)	কার্যকারিতা (কার্যকারিতা কোড ব্যবহার করুন)
		২০%	৪০%	৬০%	৮০%	১০০%		

প্রচার পদ্ধতি কোডঃ ১- বাড়ি বাড়ি মৌখিক ভাবে প্রচার, ২- মাইকিং/মৌখিক ভাবে রাস্তায় রাস্তায়, ৩- মেগাফোন, ৪- রেডিও/টিভি, ৫- সংবাদপত্র, ৬- ঢোলশরদ/শিংগা, ৭- টেলিফোন, ৮ মোবাইল ফোন, ৯- ফ্যাক্স, ১০- টেলিগ্রাফ, ১১- মসজিদ মাইক/মন্দিরের ঘন্টা, ১২- সরকারী বিজ্ঞপ্তি, ১৩- জনসভা, ১৪- দুর্যোগের পতাকা টাঙানো, ১৫- সাইরেন, ১৬-আলোক সংকেত, ১৭- ইলেকট্রনিক নোটিশ বোর্ড,১৮-কমিউনিটি/বাজারে নোটিশ বোর্ড, ১৯- মোবাইল ফোন এসএমএস, ২০- ইন্টারনেট ভিত্তিক ওয়েবসাইট, ২১- স্থানীয় সরকার প্রতিনিধি মারফত (মেম্বার/চেয়ারম্যান), ২২- সরকারী অফিসের কর্মকর্তা মারফত, ২৩- এনজিও ও সুশীল সমাজের সংস্থা মারফত, ৯৯- অন্যান্য (নির্দিষ্ট করুন)।
গুণগতমান কোডঃ ১-খারাপ, ২-মোটামুটি, ৩-ভাল
কার্যকারিতার মাত্রা কোডঃ ০- অকার্যকর, ১- খুব কম কার্যকর, ২- কম কার্যকর, ৩- মোটামুটি কার্যকর, ৪- খুব কার্যকর, ৫- খুব বেশী কার্যকর

৪.১৪ আপদের সময় যে আগাম সতর্কবার্তা আপনি পেয়ে থাকেন সেখানে কি কি উল্লেখ থাকে?

আপদ (আপদ কোড ব্যবহার করুন)	বার্তা প্রাপ্তির প্রকার (বার্তা প্রাপ্তির ধরণ কোড ব্যবহার করুন)	বার্তায় উল্লেখিত তথ্যের উপস্থিতি			আগাম সতর্কবার্তা/বুলেটিন বোঝার ক্ষেত্রে আপনার সামর্থ্য (প্রতি দুর্যোগের জন্য যে কোন একটি ঘরে √ দিন)			
		সময় নির্দিষ্টতা (কখন দুর্যোগ হতে পারে)	আপদের তীব্রতা (কত ভয়াবহ)	ব্যাপ্তিকাল (দুর্যোগ কত সময় চলবে)	মোটেই বোঝেন না	অল্প বুঝতে পারেন	মোটামুটি বুঝতে পারেন	খুব ভালভাবে বুঝতে পারেন
সঠিকভাবে প্রধান আপদগুলোর জন্য								

***আপদ কোডঃ** ১- ঘূর্ণিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩- নগর বন্যা, ৪- আকস্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা, ৭- টর্নেডো, ৮- ভূমিধ্বস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকাণ্ড, ৯৯- অন্যান্য (নির্দিষ্ট করুন) **বার্তার প্রকার কোডঃ** ১- সংস্থা/ইউনিয়ন পরিষদ থেকে প্রচারিত মৌখিক বার্তা, ২- বিশেষ বুলেটিন, (দুর্যোগ বার্তা, DMB,BMD, DMIC, জেলা প্রশাসন)**৩-** দৈনিক আবহাওয়া বার্তা (খবর), ৪- ত্রৈমাসিক আবহাওয়া সংবাদ, **৫-** বার্ষিক পরিকল্পনা, অন্যান্য (নির্দিষ্ট করুন), ৬- ইলেক্ট্রনিক গনমাধ্যম থেকে প্রচারিত খবর (রেডিও, টি.ভি) **৭-** পত্র পত্রিকায় প্রকাশিত খবর, ৯৯- অন্যান্য (নির্দিষ্ট করুন)

৪.১৫ আপনার পরিবার কোন মাধ্যমে আগাম সতর্কবার্তা পেতে পছন্দ করেন?

আপদ (কোড ব্যবহার করুণ)	কাঙ্ক্ষিত প্রচার মাধ্যম (প্রচার মাধ্যম কোড ব্যবহার করেন)		
	দিনের বেলা	রাতের বেলা	অক্ষম বা পঙ্গু ব্যক্তিদের জন্য
সঠিকভাবে প্রধান আপদ গুলোর জন্য			

***আপদ কোডঃ** ১- ঘূর্ণিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩- নগর বন্যা, ৪- আকস্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা, ৭- টর্নেডো, ৮- ভূমিধ্বস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকাণ্ড, ১৩- অন্যান্য (নির্দিষ্ট করুন)
প্রচার পদ্ধতি কোডঃ ১- বাড়ি বাড়ি মৌখিক ভাবে প্রচার, ২- মাইকিং/মৌখিক ভাবে রাস্তায় রাস্তায় প্রচার, ৩- মেগাফোন, ৪- রেডিও/টিভি, ৫- সংবাদপত্র, ৬- ঢোলশরদ/শিংগা, ৭- টেলিফোন, ৮০ মোবাইল ফোন, ৯- ফ্যাক্স, ১০- টেলিগ্রাফ, ১১- মসজিদ মাইক/মন্দিরের ঘন্টা, ১২- সরকারী বিজ্ঞপ্তি, ১৩- জনসভা, ১৪- দুর্যোগের পতাকা টাঙানো, ১৫- সাইরেন, ১৬-আলোক সংকেত, ১৭- ইলেকট্রনিক নোটিশ বোর্ড, ১৮- মোবাইল ফোন এসএমএস, ১৯- ইন্টারনেট ভিত্তিক ওয়েবসাইট, ২০- স্থানীয় সরকার প্রতিনিধি মারফত (মেম্বার/চেয়ারম্যান), ২১- সরকারী অফিসের কর্মকর্তা মারফত, ২২- এনজিও ও সুশীল সমাজের সংস্থা মারফত, ৯৯- অন্যান্য (নির্দিষ্ট করুন)।

৪.১৬ কোন কোন ধরনের যোগাযোগ মাধ্যমগুলো বর্তমানে আপনার ব্যবহারের সুযোগ রয়েছে ? (উত্তর একাধিক হতে পারে, নির্দিষ্ট করে √ দিন)

☐	রেডিও	☐	ফ্যাক্স	☐	ভি.সি.আর/ ভি.সি.ডি
☐	টেলিভিশন	☐	বেতার/ওয়াকিটকি	☐	মাইক
☐	ল্যান্ড ফোন	☐	পত্রিকা	☐	মেগাফোন
☐	মোবাইল ফোন	☐	এইচ.এফ/ভি. এইচ. এফ	☐	মেইল/ কুরিয়ার সার্ভিস
☐	অন্যান্য (নির্দিষ্ট করুন)	☐	বহনযোগ্য পি.সি	☐	ইন্টারনেট/ ই. মেইল

৪.১৭ আপনি কি আগাম সতর্কতার জন্য কোন স্থানীয় ভাবে প্রচলিত জ্ঞান ব্যবহার করেন ? (শুধুমাত্র একটি ঘরে √ দিন)

কখনওনা	প্রতিদিন	ঋতুভিত্তিক	বার্ষিক	ঘনটা সাপেক্ষে

যদি আপনি পূর্ব সতর্কীকরণের জন্য কোন স্থানীয়ভাবে প্রচলিত জ্ঞানের উপর নির্ভর করেন সেগুলো কি কি?

লোকজ জ্ঞান*	কোন আপদের জন্য**	কার্যকারিতার মাত্রা***

***লোকজন জ্ঞানের কোডঃ** ১- মেঘের গতিপ্রকৃতি দেখে, ২- বাতাসের গতি প্রকৃতি দেখে, ৩- নদী/সমুদ্রের পানির উচ্চতা, ৪- বর্ষাকালের মাস/সপ্তাহ পর্যবেক্ষন লোক, ৫- অমাবস্যা/পূর্ণিমা পর্যবেক্ষনর করে, ৬- পশু পাখির আচরন থেকে, ৭- কীট পতঙ্গের চলাচল থেকে, ৮- নদী/সমুদ্রের পানি ও ঢেউ পর্যবেক্ষন করে, ৯- সূর্য্যালোকের পর্যবেক্ষন, ১০- নদী/সমুগেদ্রর ঢেউয়ে পলি বা বালির পমিান থেকে, ১১- নদী/সমুদ্রের পানির তাপমাত্রা পর্যবেক্ষন, ৯৯- অন্যান্য (উলেখ করুন)।

****আপদ কোডঃ** ১- ঘূর্নিঝড়/জলোচ্ছাস, ২- নদীবাহিত বন্যা, ৩- নগর বন্যা, ৪- আকষ্মিক বন্যা, ৫- নদী ভাঙ্গন, ৬- খরা, ৭- টর্নেডো, ৮- ভূমিধবস, ৯- কালবৈশাখী, ১০- সুনামি, ১১- ভূমিকম্প, ১২- অগ্নিকাণ্ড, ১৩- অন্যান্য (নির্দিষ্ট করুন)

*****কার্যকারিতার মাত্রা কোডঃ** ০- অকার্যকর, ১- খুব কম কার্যকর, ২- কম কার্যকর, ৩- মোটামুটি কার্যকর, ৪- খুব কার্যকর, ৫- খুব বেশী কার্যকর

৪.১৮ কোন কোন প্রতিষ্ঠানগুলোকে আপনার কমিউনিটিতে আগাম সতর্কবার্তা/পূর্বাভাস প্রচারের জন্য অধিক নির্ভরযোগ্য ও অধিক কার্যকরী বলে মনে করেন (শুধুমাত্র উপজেলার নীচ পর্যন্ত)? (প্রাধান্য অনুযায়ী লিপিবদ্ধ করুন)।

	সুযোগ/সহজপ্রাপ্য	নির্ভরযোগ্য	কার্যকরী
উপজেলা প্রশাসন (ইউএনও অফিস)			
দুর্যোগ ব্যাপস্থাপনা কমিটি সমূহ (উপজেলা ও ইউনিয়ন)			
স্থানীয় এনজিও (উক্ত জেলায়)			
জাতীয় পর্যায়ের এনজিও			
রেড ক্রস/রেড ক্রিসেন্ট			
শিক্ষা প্রতিষ্ঠান (স্কুল/কলেজ)			
হাট বাজার কমিটি			
পুলিশ ষ্টেশন (থানা)			
অন্যান্য (নির্দিষ্ট করুন)			

৪.১৯ আগাম সতর্কবার্তা/পূর্বাভাস পাওয়ার পর আপনি কি কি করেন? (নির্দিষ্ট করে (√) টিক চিহ্ন দিন; একাধিক উত্তর হতে পারে)

- ☐ কিছুই করেনা
- ☐ নিরাপদ আশ্রয়ে চলে যান
- ☐ গৃহস্থালী তৈজসপত্র/শস্য প্রভৃতি সংরক্ষনের ব্যবস্থা করা
- ☐ বাহির থেকে সাহায্যের অপেক্ষায় থাকা
- ☐ অন্যান্য (নির্দিষ্ট করুন)
- ☐ প্রতিবেশীদের সাথে কথা বলে প্রাপ্ত তথ্যের সত্যতা/যথার্থতা যাচাই করেন
- ☐ পরিবার ও আত্মীয় স্বজনদের সাথে কথা বলে সত্যতা যাচাই করেন
- ☐ পরিবারের সদস্যদের সাথে পরামর্শ করেন
- ☐ ইউনিয়ন পরিষদের প্রতিনিধিদের কাছ থেকে প্রাপ্ত তথ্যের সত্যতা যাচাই করেন।

৪.২০ আপনি যদি প্রয়োজনীয় সময় হাতে রেখে আগাম সতর্কবার্তা/পূর্বাভাস পান তাহলে প্রয়োজনীয় প্রস্তুতি নেয়ার সুযোগ কতটুকু? (শুধুমাত্র একটি ঘরে √ দিন)

একদম সুযোগ নেই	খুব কম সুযোগ রয়েছে	কিছু সুযোগ আছে	মোটামুটি সুযোগ রয়েছে	প্রায় পর্যাপ্ত সুযোগ রয়েছে	পর্যাপ্ত সুযোগ রয়েছে
০	১	২	৩	৪	৫

৪.২১ আপনার কমিউনিটিতে আগাম সতর্কবার্তা/পূর্বাভাস প্রাচারে কোন বিষয়গুলো বাধা সৃষ্টি করছে?
(প্রাধন্যতার ভিত্তিতে প্রতিটি ঘরে নাম্বার দিতে হবে; ১ হচ্ছে সবচেয়ে নেতিবাচক)

সতর্কীকরন বার্তা পাবার অনিশ্চয়তা ও ধারাবাহিকতার অভাব রয়েছে	আগাম সতর্ক বার্তার বিশ্বস্থতা ও পূর্ব অভিজ্ঞতা	পূর্ব সতর্কীকরণ প্রচার	সার্বিক বোধগম্যতা	সাড়া প্রদান/প্রতিক্রিয়া বিষয়ক উপাদান সমূহ	স্থানীয় পর্যায়ের সতর্কতা জনিত বিষয় সমূহ

৪.২২ টাকার বিনিময়ে আপনি আপনার কমিউনিটিতে আগাম সতর্কবার্তা পেতে আগ্রহী কিনা এবং আগ্রহের মাত্রা কতটুকু? (একটি মাত্র ঘরে √ দিন)

অর্থ দিতে আগ্রহী না	সরকার টাকা দিবে	সরকারের সাথে সহযোগীতা করতে আগ্রহী (কিছু অর্থ প্রদানের মাধ্যমে)	কমিউনিটি ফাণ্ড প্রতিষ্টিত হলে তার জন্য টাকা দেয়া যেতে পারে (যদি তা জীবন রক্ষা করতে সহযোগিতা করে।	আর্থিক সহযোগিতায় কম আগ্রহী যদি তা জীবন জীবিকার সাথে সম্পর্কত সম্পদ রক্ষার্থে কাজে লাগে।	খানা থেকে অর্থ দিতে আগ্রহী
০	১	২	৩	৪	৫

৪.২৩ আপনার কমিউনিটিতে বিভিন্ন বয়সী ও লিঙ্গের মানুষদের মধ্যে আগাম সতর্কবার্তা পাবার কি কি সুবিধা রয়েছে? (সঠিক উত্তরের পাশের নির্ধারিত ঘরে √ চিহ্ন দিন, উত্তর একাধিক হতে পারে)

	পুরুষ	মহিলা	বৃদ্ধ/বৃদ্ধা	শিশু
বর্তমানে বিদ্যমান আগাম সতর্কবার্তা				
রেডিও/টিভির মাধ্যমে আবহাওয়া বার্তা				
পূর্বসতর্কীকরণ ও সচেতনতার জন্য উঠান বৈঠক				
হাট বাজার প্রভৃতি জনগুরুত্বপূর্ণ স্থানে সভাকরে আগাম সতর্কতা প্রচার				
রেডিও				
টেলিভিশন সংবাদ				
ইন্টারনেট/ওয়েবসাইট/ই-মেইল ভিত্তিক যোগাযোগ ব্যবস্থা				
অন্যান্য (নির্দিষ্ট করুন)				

৪.২৪ আপনার এলাকায় আগাম সতর্কবার্তা পৌছাতে কি কি প্রতিবন্ধকতা আছে বলে আপনি মনে করেন। *(✓ চিহ্ন দিন, উত্তর একাধিক হতে পারে)*

অনিশ্চয়তা ও অসামঞ্জস্যতা :

- ☐ আগাম সতর্কবার্তার অপ্রাপ্যতা
- ☐ অসময়ে আগাম সতর্কবার্তা প্রাপ্তি
- ☐ আপদ চিহ্নিতকরণে অনিশ্চয়তা (সময়, ভৌগোলিক অবস্থান, মাত্রা প্রভৃতি।
- ☐ অসম্পূর্ন সতর্কবার্তা
- ☐ ভূয়া সতর্কবার্তা
- ☐ প্রাপ্ত সতর্কবার্তার ধারাবাহিকভাবে চালু রাখা

আস্থা ও অভিজ্ঞতা সংক্রান্ত বিষয়:

- ☐ বিদ্যমান আগাম সতর্কবার্তায় আস্থার অভাব
- ☐ লোকজন আগাম বার্তা ব্যবহারে অভ্যস্ত না।
- ☐ লোকজন আগাম সতর্কবার্তাকে গুরুত্বসহকারে গ্রহন করেনা

আগাম সতর্ক বার্তা প্রচার সংক্রান্ত বিষয়:

- ☐ জাতীয় পর্যায় হতে প্রদান
- ☐ জেলা পর্যায় হতে প্রদান
- ☐ উপজেলা পর্যায় হতে প্রদান
- ☐ কমিউনিটি পর্যায় হতে প্রদান

বোধগম্যতা ও সমন্বয় সংক্রান্ত বিষয়:

- ☐ আগাম সতর্কবার্তার বোধগম্যতার অভাব
- ☐ কি পরিমান বিরূপ প্রভাব পড়তে সে সম্পর্কে ধারনা করতে না পারা
- ☐ সতর্কবার্তায় হঠাৎ ব্যপক পরিবর্তন (এক ক্যাটাগরি থেকে অন্য ক্যাটাগরিতে জাম্প করা)

প্রতিক্রিয়া সংক্রান্ত বিষয়:

- ☐ লোকজন অবস্থা চরম খারাপ হওয়া পর্যন্ত অপেক্ষা করে
- ☐ সাড়া প্রদান করার জন্য তেমন কোন সুযোগ নেই
- ☐ ভাগ্যের উপর ছেড়ে দেয়

স্থানীয় পর্যায়ে সক্ষমতা বিষয়ক নিয়ামকসমুহ:

- ☐ আগাম সতর্কবার্তা প্রচারের জন্য প্রয়োজনীয় যন্ত্রপাতির অভাব
- ☐ সতর্কবার্তা প্রচারের জন্য দক্ষ জনশক্তির অভাব
- ☐ স্থানীয় পর্যায়ে প্রতিষ্ঠানের অভাব যেখান থেকে সতর্কবার্তা প্রচার করা হবে
- ☐ অন্যান্য (উলেখ করুন)

৪.২৫ কমিউটিটি পর্যায়ে আগাম সতর্কবার্তা ব্যবস্থা আরও জোরদার করতে কি করা যেতে পারে বলে আপনি মনে করেন?

১).....
২).. .....
৩).. .....
৪).. .....

৪.২৬ কমিউনিটি পর্যায়ে আগাম সতর্ক বার্তা ব্যবস্থা টেকসই করতে আপনার পরামর্শ উল্লেখ করুন?

১).. .....
২).. .....
৩).. .....
৪).....

সাক্ষাতকার গ্রহনকারীর স্বাক্ষর	গবেষকের স্বাক্ষর

Annex 1b. CLIFMA household survey tables

Annex table 1. Table. Survey coverage.

District	Upazila	Union	Nos of HH
Bagerhat	Mongla	Mithakhali	32
Bandarban	Bandarban Sadar	Ward No-09	32
Bhola	Char Fasson	Hazariganj	32
Bogra	Dhunat	Bhandarbari	32
Chandpur	Chandpur Sadar	Ibrahimpur	32
Chittagong	Anowara	Roypur	32
Chittagong	Hathazari	Forhadabad-Hathazari	32
Cox`s Bazar	Maheshkhali	Chhotamohes Khali	32
Gaibandha	Fulchhari	Uria	32
Habiganj	Lakhai	Bulla	32
Kurigram	Ulipur	Hatia	32
Manikganj	Shibalaya	Shibalaya	32
Naogaon	Sapahar	Sapahar	32
Nawabganj	Nachole	Nachole	32
Pabna	Bera	Kaitala	32
Pabna	Pabna Sadar	Bharara	32
Pabna	Sujanagar	Nazirganj	32
Patuakhali	Kala Para	Lata Chapli	32
Rajshahi	Bagha	Gargari	32
Rajshahi	Godagari	Gogram	32
Satkhira	Shyamnagar	Munshiganj	32
Sirajganj	Kazipur	Kazipur	64
Sunamganj	Bishwambarpur	Dakshin Badaghat	32
Sylhet	Balaganj	Balaganj	32
Total Dist=20	**Total Upazila= 25**	**Total Union=25**	**Total Households = 800**

Annex table 2. The detailed distribution of household samples by hazards and number of male-female interviewees.

Study criteria (Hazard coverage)	Well being group	Gender	No. of participants in each community	No. of participants in 3 communities	Total by Hazard
Cyclone dominant- tsunami lesser	Well off	Male	4	12	
		Female	4	12	
	Break even	Male	4	12	
		Female	4	12	
	Occasionally deficit	Male	4	12	
		Female	4	12	
	Always deficit	Male	4	12	
		Female	4	12	
	Total		**32**	**96**	**96**
Tsunami dominant – cyclone lesser	Well off	Male	4	12	**96**
		Female	4	12	
	Break even	Male	4	12	
		Female	4	12	
	Occasionally deficit	Male	4	12	
		Female	4	12	

Study criteria (Hazard coverage)	Well being group	Gender	No. of participants in each community	No. of participants in 3 communities	Total by Hazard
	Always deficit	Male	4	12	
		Female	4	12	
	Total		**32**	**96**	
Riverine Flood (upper reach)	Well off	Male	4	12	
		Female	4	12	
	Break even	Male	4	12	
		Female	4	12	
	Occasionally deficit	Male	4	12	
		Female	4	12	
	Always deficit	Male	4	12	
		Female	4	12	
	Total		**32**	**96**	
Riverine Flood (middle reach)	Well off	Male	4	12	
		Female	4	12	
	Break even	Male	4	12	
		Female	4	12	
	Occasionally deficit	Male	4	12	
		Female	4	12	
	Always deficit	Male	4	12	
		Female	4	12	
	Total		**32**	**96**	
Riverine Flood (lower reach)	Well off	Male	4	12	
		Female	4	12	
	Break even	Male	4	12	
		Female	4	12	
	Occasionally deficit	Male	4	12	
		Female	4	12	
	Always deficit	Male	4	12	
		Female	4	12	
	Total		**32**	**96**	**288**
Drought	Well off	Male	4	12	
		Female	4	12	
	Break even	Male	4	12	
		Female	4	12	
	Occasionally deficit	Male	4	12	
		Female	4	12	
	Always deficit	Male	4	12	
		Female	4	12	
	Total		**32**	**96**	**96**
River bank erosion	Well off	Male	4	12	
		Female	4	12	
	Break even	Male	4	12	
		Female	4	12	
	Occasionally deficit	Male	4	12	
		Female	4	12	
	Always deficit	Male	4	12	
		Female	4	12	
	Total		**32**	**96**	**96**
Flash Flood	Well off	Male	4	8	
		Female	4	8	
	Break even	Male	4	8	
		Female	4	8	
	Occasionally deficit	Male	4	8	
		Female	4	8	

Study criteria (Hazard coverage)	Well being group	Gender	No. of participants in each community	No. of participants in 3 communities	Total by Hazard
	Always deficit	Male	4	8	
		Female	4	8	
	Total		**32**	**64**	**64**
Land Slide	Well off	Male	4	8	
		Female	4	8	
	Break even	Male	4	8	
		Female	4	8	
	Occasionally deficit	Male	4	8	
		Female	4	8	
	Always deficit	Male	4	8	
		Female	4	8	
	Total		**32**	**64**	**64**
Grand total of sample households					**800**

Annex table 3. Primary occupation of the heads of the sample households.

Occupational groups	Number of sample households	Percentage of total sample
Agriculture/Farmer	359	45
Fishers	44	6
Traders/ businessmen/services	114	14
Wage labour	115	14
Others	168	21
Total	800	100

Annex table 4. Distribution of household members by age and sex

Age group	Number of responses			Percentage of responses	
	Female	Male	Total	Female	Male
<10	404	398	802	50.37	49.63
10-20	542	562	1104	49.09	50.91
21-30	391	433	824	47.45	52.55
31-40	296	311	607	48.76	51.24
41-50	176	213	389	45.24	54.76
51+	174	280	454	38.33	61.67
Total	1983	2197	4180	47.44	52.56

Annex table 5. Education level of the household heads.

Education level	No. of household heads	Proportion of household heads
Illiterate	248	31.00
Non formal literacy	152	19.00
Up to class 5	164	20.50
class 6 to 10	132	16.50
S.S.C. or equivalent	55	6.88
H.S.C. or equivalent	27	3.38
Bachelor's degree or equivalent	11	1.38
Master's degree or equivalent or above	11	1.38
Total	800	100.00

Annex table 6. Education level of the household members.

Category	Number of responses	Percentage of responses
Child/Infant	1,285	31
Illiterate	429	10
Non formal literacy	1,129	27
Up to class 5	871	21
class 6 to 10	230	6
S.S.C. or equivalent	133	3
H.S.C. or equivalent	74	2
Bachelor's degree or equivalent	29	1
Total	4,180	100

Annex table 7. Income and expenditure distribution of the sample households

Income category (Amount in BDT)	No. of households		Percentage of households	
	Income	Expenditure	Income	Expenditure
<10000	14	12	1.75	1.5
10000-15000	22	14	2.75	1.75
15001-20000	18	14	2.25	1.75
20001-25000	42	22	5.25	2.75
25001-30000	57	41	7.13	5.13
30001-40000	103	107	12.88	13.38
40001-50000	96	107	12	13.38
50001-60000	76	105	9.5	13.13
60001-70000	74	84	9.25	10.50
70001-80000	74	79	9.25	9.88
80001-90000	39	56	4.88	7
90001-100000	49	62	6.13	7.75
100001-150000	63	71	7.88	8.88
>150000	73	26	9.13	3.25
Total	800	800	100	100

Annex table 8. Availability of response options by the households in the disaster preparedness.

Response options	No. of responses	Percentage of responses
Don't have any options (0)	77	9.63
Very little options (1)	208	26.00
Some options (2)	115	14.38
Good options (3)	170	21.25
Near sufficient options (4)	124	15.50
Sufficient options (5)	106	13.25
Total	800	100.00

Annex table 9. Existing role of EW to save resources (in past years)

Asset types	No. of responses			Per. of responses	
	Fully	Partly	total	Fully	Partly
Human life	51	241	292	17.47	82.53
Household assets	176	571	747	23.56	76.44
Livelihoods assets	141	473	614	22.96	77.04
Crops/catch/production	252	323	575	43.83	56.17
Employment	168	388	556	30.22	69.78
All type of assets	788	1996	2784	28.30	71.70

Annex table 10. Damage experienced by households by respective hazards in past years

Hazards	No. of responses			Percentage of responses	
	Fully	Partly	Total	Fully	Partly
Cyclone/Storm surge	151	574	725	20.83	79.17
Riverine flood	274	541	815	33.62	66.38
Flash flood	127	290	417	30.46	69.54
Riverbank erosion	122	264	386	31.61	68.39
Drought	26	189	215	12.09	87.91
Tornado	31	13	44	70.45	29.55
Landslide	18	39	57	31.58	68.42
Nor'wester	45	122	167	26.95	73.05
Others	5	14	19	26.32	73.68
Total	799	2046	2845	28.08	71.92

Annex table 11. Perceived responses on the proportion of various types of assets can be saved through EW in future

Asset types	No. of responses			Per. of responses	
	Fully	Partly	total	Fully	Partly
Human life	625	66	691	90.45	9.55
Household assets	229	524	753	30.41	69.59
Livelihoods assets	207	435	642	32.24	67.76
Crops/catch/production	74	510	584	12.67	87.33
Employment	125	403	528	23.67	76.33
Others	1	48	49	2.041	97.96
All type of assets	1261	1986	3247	38.84	61.16

Annex table 12. Availability of response options of the households.

Response options	No. of responses	Percentage of responses
Don't have any options (0)	77	9.63
Very little options (1)	208	26.00
Some options (2)	115	14.38
Good options (3)	170	21.25
Near sufficient options (4)	124	15.50
Sufficient options (5)	106	13.25
Total	800	100.00

Annex table 13. Association between household types and response options by no. of households.

Type of households	Don't have any options (0)	Very little options (1)	Some options (2)	Good options (3)	Near sufficient options (4)	Sufficient options (5)	Total no. HHs
Always deficit	28	92	24	16	16	19	195
Occasionally deficit	39	76	31	26	25	18	215
Break even	2	28	44	56	44	34	208
Well off	8	12	16	72	39	35	182
Total	77	208	115	170	124	106	800

Annex table 14. Reliance on EW information by the households.

Type of EW	Number of responses	Percentage of responses
Institutional	281	19.15
Indigenous	376	25.63
Both	504	34.36
None	306	20.86
Total	1467	100.00

Annex table 15. Reliance on EW information by the households.

Hazards	No. of responses					Percentage of responses			
	Inst.	Indigen.	Both	None	Total	Institutional	Indigenous	Both	None
Cyclone/Storm surge	42	12	154	7	215	19.53	5.58	71.63	3.26
Riverine flood	53	96	121	97	367	14.44	26.16	32.97	26.43
Flash flood	25	48	23	28	124	20.16	38.71	18.55	22.58
Riverbank erosion	11	100	45	74	230	4.78	43.48	19.57	32.17
Drought	23	69	8	29	129	17.83	53.49	6.20	22.48
Landslide	24	12	21	6	63	38.10	19.05	33.33	9.52

Annex table 16. Frequency of use of various Indigenous/local knowledge for EW.

Local knowledge	No. of responses	Per. of responses
Never	57	7.13
Daily	10	1.25
Seasonally	458	57.25
Inter-annually	21	2.63
On event	254	31.75
Total	800	100.00

Annex table 17. Association between type of households and their use of various types of EWSs.

Household types	No. of responses					Percentage of responses			
	Inst.	Indigen.	Both	None	Total	Institutional	Indigenous	Both	None
Always deficit	66	89	107	95	357	18.49	24.93	29.97	26.61
Occasionally deficit	78	109	138	77	402	19.40	27.11	34.33	19.15
Break even	67	91	136	66	360	18.61	25.28	37.78	18.33
Well off	68	87	123	58	336	20.24	25.89	36.61	17.26

Annex table 18. Situation when the households react.

Situation	Nos of HH	Percentage (%)
0. When someone dies in the community	85	11
1. When people observe some damage to properties	64	8
2. When hazard arrives in the area	261	33
3. In case of panic situation only/ officials put enforcement	116	15
4. When information is widely spread in among community and others start acting	90	11
5. Whenever EW is heard	184	23
Total	800	100

Annex table 19. Early warning information access/ receival status of the households.

Hazard	No. of responses			Per. of responses	
	No	Yes	Total	No	Yes
Cyclone/Storm surge	0	210	210	0.00	100.00
Riverine flood	17	240	257	6.61	93.39
Flash flood	20	68	88	22.73	77.27
Riverbank erosion	29	86	115	25.22	74.78
Drought	9	86	95	9.47	90.53
Landslide	9	53	62	14.52	85.48
Others	7	52	59	11.86	88.14

Annex table 20. Type of early warning information received in the community.

Types of EW information	Responses on availability	Percentage of responses
Verbal warning from agencies/UP	306	18.17
Special Bulletin	124	7.36
Weather information/ News	203	12.05
Seasonal Outlook	251	14.90
Annual Plan/Outlook	46	2.73
Electronic Media news/commentaries (TV/Radio)	730	43.35
Print media news/commentaries	18	1.07
Others	6	0.36
Total	**1684**	100.00

Annex table 21. Association of income level and EW reliance.

Income	Institutional	Indigenous	Both	None
<10000	5	2	8	8
10000-15000	5	13	12	19
15001-20000	6	7	4	13
20001-25000	19	29	26	13
25001-30000	26	31	37	24
30001-40000	33	53	68	37
40001-50000	30	42	53	33
50001-60000	23	37	43	28
60001-70000	22	26	49	28
70001-80000	28	34	46	28
80001-90000	15	29	27	11
90001-100000	17	20	37	10
100001-150000	20	24	42	17
>150000	30	29	52	29

Annex table 22. Table. Association of income level and EW reliance.

Operating land/ownership (in decimal)	Institutional	Indigenous	Both	None
< 10	76	145	217	140
11-30	53	44	90	38
31-50	26	37	43	27
51-70	16	23	27	15
71-90	6	7	6	2
91-110	13	13	12	8
110-130	2	3	10	2

130-150	7	15	18	7
150+	80	89	81	57
Total	279	376	504	296

Annex table 23. Association of income level and EW reliance (analyzed and in both no. and percentage).

Operating land/ownership	No. of responses					Per. of responses			
	Inst.	Indig.	Both	None	Total	Inst.	Indig.	Both	None
0-30 decimal	129	189	307	178	803	16.06	23.54	38.23	22.17
30-90 decimal	48	67	76	44	235	20.43	28.51	32.34	18.72
90+ decimal	102	120	121	74	417	24.46	28.78	29.02	17.75

Annex table 24. Association of education level and EW reliance (analyzed and in both no. and percentage).

Level of education	No. of response				Percentage of response			
	Instit.	Indig.	Both	None	Instit.	Indig.	Both	None
Illiterate	84	134	128	96	29.27	35.73	25.35	32.54
Non formal literacy	26	64	110	62	9.06	17.07	21.78	21.02
Up to class 5	55	74	118	46	19.16	19.73	23.37	15.59
class 6 to 10	71	55	81	48	24.74	14.67	16.04	16.27
S.S.C. or equivalent	27	20	38	23	9.41	5.33	7.52	7.80
H.S.C. or equivalent	18	18	20	7	6.27	4.80	3.96	2.37
Bachelor's degree or equivalent	3	6	2	6	1.05	1.60	0.40	2.03
Master's degree or equivalent or above	3	4	8	7	1.05	1.07	1.58	2.37
Total	287	375	505	295	100.00	100.00	100.00	100.00

Annex table 25. Activities households carry out after receiving EW information.

Activities	No. of responses	Per. of responses
Do nothing	40	1.97
Discuss and validate from Community (family/friends/UP/others)	724	35.68
Move to safer location	338	16.66
Organize/arrange household & livelihoods assets/crops	497	24.49
Discuss things within the household	387	19.07
Wait for external assistance	35	1.72
Others	8	0.39

Annex table 26. Existing lead-time available by selected hazards.

Lead Time	Number of responses			Percentage of responses		
	Cyclone/Storm surge	Riverine flood	Drought	Cyclone/Storm surge	Riverine flood	Drought
Upto12 hours	163	67	7	77.99	29.26	8.43
12-24 hours	33	74	3	15.79	32.32	3.61
2-5 days	12	64	12	5.74	29.69	14.46
5-10 days	0	5	1	0.00	2.18	1.20
Monthly	0	4	5	0.00	1.75	6.02
Seasonally/ Annually	1	11	55	0.48	4.80	66.27

Annex table 27. Preferred/needed lead-time of EW by major occupational groups.

Hazard	Occupation	No. of responses						Percentage of responses					
		Upto12 hours	12-24 hours	2-5 days	5-10 days	Monthly	Seasonally/	Total	Upto12 hours	12-24 hours	2-5 days	5-10 days	Monthly	Seasonally/
Cyclone	Agriculture/ Farmer	2	7	21	0	0	0	30	6.67	23.33	70.00	0.00	0.00	0.00
Cyclone	Fishers	1	3	8	2	0	0	14	7.14	21.43	57.14	14.29	0.00	0.00
Riverine flood	Agriculture/ Farmer	3	1	8	130	94	18	254	1.18	0.39	3.15	51.18	37.01	7.09
Riverine flood	Fishers	0	1	2	15	9	0	27	0.00	3.70	7.41	55.56	33.33	0.00
Drought	Agriculture/ Farmer	0	0	1	1	44	19	65	0.00	0.00	1.54	1.54	67.69	29.23

Annex table 28. Efficiency of the received early warning information.

Efficiency Type	No. of responses	Percentage
Not effective at all	126	11.33
Very low efficacy	16	1.44
Low efficacy	81	7.28
Medium efficacy	526	47.30
High efficacy	324	29.14
Very high efficacy	39	3.51
Total	1112	100.00

Annex table 29. Responses on the existing and preferred sources of EW.

EW source	No. of responses		Percentage of responses	
	Existing source	Preferred sources	Existing source	Preferred sources
Union Parishad representatives	255	714	8.96	14.37
UDMC representatives	61	343	2.14	6.90
Radio	667	702	23.44	14.13
TV	654	692	22.99	13.93
Newspaper	45	41	1.58	0.83
Neighbors/relative	345	235	12.13	4.73
Mosque/Temple	166	512	5.83	10.30
Bazar/haat	108	204	3.80	4.11
Choukidar/dafadar	36	126	1.27	2.54
Red Crescent	144	216	5.06	4.35
School/Madrasa	4	129	0.14	2.60
UNO office	22	135	0.77	2.72
Government departments	14	441	0.49	8.88
NGO	116	389	4.08	7.83
Purashava/ward	39	49	1.37	0.99
Others	169	41	5.94	0.83
Total	2845	4969	100.00	100.00

Annex table 30. EW Information sharing with others.

Status of sharing	No. of responses	Percentage of responses
Never shares	170	21.30
If anyone shows interest then only	21	2.63
In case of own households need only	16	2.01
Depending on the perceived severity of the hazard	122	15.29
In case of panic situation only	30	3.76
Share all the time as and when information is received	439	55.01
Total	798	100.00

Annex table 31. Reponses on the trust on the EW information by hazards and overall.

Hazard	No. of responses							Percentage of responses					
	No trust at all	Very low trust (~20%)	Low trust (~40%)	Medium trust (~60%)	High (~80%)	Full trust (100%)	Total	No trust at all	Very low trust (~20%)	Low trust (~40%)	Medium trust (~60%)	High (~80%)	Full trust (100%)
Cyclone/ Storm surge	1	0	6	72	80	37	196	0.51	0.00	3.06	36.73	40.82	18.88
Riverine flood	33	3	5	106	42	44	233	14.16	1.29	2.15	45.49	18.03	18.88
Flash flood	50	0	8	25	16	1	100	50.00	0.00	8.00	25.00	16.00	1.00
Riverbank erosion	16	3	2	28	27	20	96	16.67	3.13	2.08	29.17	28.13	20.83
Drought	2	3	2	21	26	2	56	3.57	5.36	3.57	37.50	46.43	3.57
Landslide	0	0	3	13	21	10	47	0.00	0.00	6.38	27.66	44.68	21.28
Total	103	14	28	288	224	117	774	13.31	1.81	3.62	37.21	28.94	15.12

Annex table 32. Responses on the validation of the EW information by the households.

Validation category	No. of responses	Percentage of responses
Never validate	188	23.50
Validate 25% of the time	45	5.63
Validate 50% of the time	190	23.75
Validate 75% of the time	235	29.38
Validate always 100% of the time	142	17.75
Total	800	100.00

Annex table 33. Efficacy of various early warning dissemination modes.

EW Dissemination modes	Percentage of Weighted Average
Radio/TV	33.5
Miking/Orally road to road	16.6
Community/Market-place notice board	8.1
Mosque mike/Temple bell	7.9
Orally door to door	7.2
Megaphone/Dhol-shorod/Singa/Siren	5.3
Mobile phone and sms	5.2
Flag hoisting	4.6
Through NGOs and civil society/public meeting	4.5
Through local govt. representative (members/chairman)	3.6

Newspaper	1.3
Not sure and others	1.1
Through government department officials	0.6
Official letter	0.4
Land telephone	0.1
Telegraph	0.1
Total	100.0

Annex table 34. Quality of various early warning dissemination modes

	No. of responses				Percentage of responses			
Dissemination mode	Bad	Moderate	Good	Not Known	Bad	Moderate	Good	Not Known
Radio/TV	14	351	301	55	45.2	40.7	28.9	38.7
Miking/Orally road to road	3	147	173	15	9.7	17.1	16.6	10.6
Mosque mike/Temple bell	0	65	90	10	0.0	7.5	8.7	7.0
Orally door to door	1	59	76	3	3.2	6.8	7.3	2.1
Community/Market-place notice board	1	86	75	13	3.2	10.0	7.2	9.2
Mobile phone and sms	5	25	69	2	16.1	2.9	6.6	1.4
Megaphone/Dhol-shorod/Singa/Siren	1	31	67	10	3.2	3.6	6.4	7.0
Flag hoisting	1	17	60	3	3.2	2.0	5.8	2.1
Through NGOs and civil society agencies	0	23	53	1	0.0	2.7	5.1	0.7
Through local govt. representative (members/chairman)	1	22	42	5	3.2	2.6	4.0	3.5
Don't Know and others	0	20	12	20	0.0	2.3	1.2	14.1
Newspaper	4	9	12	2	12.9	1.0	1.2	1.4
Through government department officials	0	3	7	3	0.0	0.3	0.7	2.1
Land telephone	0	0	1	0	0.0	0.0	0.1	0.0
Telegraph	0	0	1	0	0.0	0.0	0.1	0.0
Official letter	0	4	1	0	0.0	0.5	0.1	0.0
Total	31	862	1040	142	100.0	100.0	100.0	100.0

Annex table 35. Level of understanding of various contents of the EW messages

Levels of understanding	No. of responses	Per. of responses
No understanding	17	1.66
Low	152	14.84
Medium	626	61.13
High	229	22.36
Total	1024	100.00

Annex table 36. Responses on understandability and interpretation of EW messages factors

Factors	No. of responses	Per. of responses
Lack of understanding of the EWM	246	28.47
Fail to interpret warning information in to potential impact	494	57.18
Consistency of the warning level	124	14.35
Total	864	100.00

Annex table 37. Access to the communication systems for EW

Communication System	No. of responses	Percentage of response
Radio	618	25.4
TV	616	25.3
Mobile/Cell phone	462	19
Mike/megaphone	577	23.7
Newspaper	99	4.06
Land telephone	7	0.29
Wireless	43	1.77
VCR-VCD/DVD/Movie theater	8	0.33
Others	6	0.25
Total	2436	100

Annex table 38. Access to various mode of EW by sex

Modes	No. of responses		Percentage of responses	
	Men	Women	Men	Women
Cell phone	688	518	24.7	27.4
TV	636	388	22.8	20.5
Radio	629	480	22.6	25.4
Public meetings	317	39	11.4	2.06
Existing formal system	290	250	10.4	13.2
Door-to-door/courtyard	207	192	7.43	10.2
Other modes	18	22	0.65	1.16
Total	2785	1889	100	100

Annex table 39. Responses on uncertainty and inconsistency factors

Factors	No. of responses	Percentage of responses
Unavailability of EW	509	34.30
Insufficient EWM content	227	15.30
Uncertainty of detecting hazard	246	16.58
un-timely availability of warning	222	14.96
False Alarm and warning	135	9.10
Continuation initial message next follow up	145	9.77
Total	1484	100.00

Annex table 40. Responses on trust and experience factors

Trust and experience factors	No. of responses	Per. of responses
Lack of trust into the existing system	244	26.61
Peoples are not habituated to use EW	360	39.26
Peoples do not take EW seriously	313	34.13
Total	917	100.00

Annex table 41. Responses on Dissemination factors

Factors	**No. of responses**	**Percentage of responses**
Dissemination from national level	236	18.73
Dissemination from district	177	14.05
Dissemination from upazila	341	27.06
Dissemination of EW at community/union level	506	40.16
Total	1260	100.00

Annex table 42. Responses on EW response factors

Factors	No. of responses	Per. of responses
People wait for the worst time and intensity of the hazard	371	31.33
People's reliance on fate (fatalistic attitude)	417	35.22
Lack of availability of response options at ground level	396	33.45
Total	1184	100.00

Annex table 43. Responses on local level capacity related factors

Factors	No. of responses	Per. of responses
Unavailability of warning dissemination equipment	413	22.61
Lack of local institution for regular warning	504	27.59
Lack of trained Human Resources	455	24.90
Other capacity related factors	455	24.90
Total	1827	100.00

Annex table 44. Responses on the willingness to pay for EW services by the households.

Willingness to pay for EW services	Nos of HH	Percentage
Not willing to pay in any case	157	19.63
Government should pay	263	32.88
Willing to share cost with government (minimal share from the community)	210	26.25
Willing to pay from the community fund (if it helps to save lives)	95	11.88
Willing to pay from the community fund (if helps to save livelihoods assets/crop production/catch)	24	3.00
Willing to pay from household	51	6.38
Total	800	100.00

Annex 1c. Distribution of field survey works among the field team groups.

Group	Group members	District name
Group-1	***Dr. Shamsul Alam** H.M Kamal Hussain) Md. Razib Mia Md. Mohammed Shohag	Sylhet Habiganj Sunamganj
Group-2	***Aminur Rahaman** Md. Safayet Hossain Tridip Barua Md.Hafizur Rahman	Chittagong Bandarban Cox's Bazar
Group-3	***Golam Maainuddin** Ibtihaj Samad Nabil Md. Sabbir Hossain Tarikul Alam M. Arifur Rahaman	Bhola Patuakhali Kurigram Satkhira Bagerhat
Group-4	***Afroza Taznin** Md. Mozammel Haque Jannatul Ferdous Md. Iftekar Hossain Md. Rezaul Kabir	Sirajganj Pabna Manikganj Bogra
Group-5	***Rabi uzzaman** Md. Masud Rana Md. Bulbul Islam Md Ashikur Rahman Md. Mahbubur Rahman	Rajshahi Chapai Naogaon Chandpur Gaibandha
Group-6	***Md. Abu Syed** Md. Iftekar Hossain Md. Rezaul Kabir	Pabna

Note: Field survey group leader

Annex 2. Community level FGD participation.

District	Upazila	Union	Vill/Community	FGD Community	Number of Participants
Sylhet	Balaganj	Sadar	Gopalpur	1(Riverbank Erosion)	13
Habiganj	Lakhai	Bulla	Radhakona	1(Flash Flood)	11
Sunamganj	Bishwambarpur	Sadar	Sreedharpur	1 (Flash Flood)	12
Cox's Bazar	Maheshkhali	Choto M.khali	Dakkhinkul	1 (Tsunami)	12
Bandarban	Sadar	Ward#9	Ward#9	1 (Landslide)	9
Chittagong	Anwara	Gohira	Khudur Gohira	1 (Cyclone)	11
Chittagong	Hathajari	Fotehabad	Sadwip Colony	1(Landslide)	9
Pabna	Sadar			1(Riverine flood)	12
Bhola	Char fashion	Hazariganj	Char Phakhira	1(Tsunami)	15
Patuakhali	Kalapara	Lata Chapli	Panjupara	1(Tsunami)	13
Bagerhat	Mongla	Mithakhali	Mithakhali	1(Cyclone)	14
Satkhira	Shyamnagar	Munshiganj	Centre Kali Nagar	1 (Cyclone)	17
Kurigram	Ulipur	Hatia	Shympur	1(Riverine flood)	18
Lalminirhat	Atitmari (LDRRF)	Mohishcucha		Riverine flood	15
Sirajganj	Kajipur	Kajipur	Southtala	2 (Riverine flood) + (Riverbank Erosion)	10
			Natun Meghai	Riverbank Erosion	15
Bogra	Dhunat	Bhandaria	Baniagram	1(Riverine flood)	10
Pabna	Bera	Koitala	Harirampur	1(Riverine flood)	13
Pabna	Sujanagar	Nadirganj	Nowagram	1(Riverine flood)	23
Manikganj	Shibalay	Shibalay	Shibalay	1(Riverine flood)	15
Rajshahi	Godagari	Gogram	Boldang	1(Riverine flood)	13
Rajshahi	Bagha	Gorbari	Sarerhat	1(Drought)	12
Chapai	Nachole	Sardar	Shibpur Shiala	1(Drought)	11
Naogaon	Shapahar	Sardar	Manipura	1(Drought)	12
Gaibandha	Phulchari	Uria	Uria	1(Riverine flood)	13
Chandpur	Chandpur Sadar	Ibrahimpur	Shukuwa	1(Riverbank Erosion)	10
Grand Total				**25**	**338**

Annex 3. Institutional FGD participation

District Name	Name of Upazilla	Institutional FGD	Number of Participants
Sunamganj	Bishwambarpur	1 (Flash Flood)	16
Cox's Bazar	Maheshkhali	1 (Tsunami)	12
Bandarban	Sadar	1 (Landslide)	12
Chittagong	Anwara	1 (Cyclone)	13
Chittagong	Hathajari	1(Landslide)	15
Kurigram	Ulipur	1(Riverine flood)	14
Patuakhali	Kalapara	1(Tsunami)	7
Bagerhat	Mongla	1(Cyclone)	11
Satkhira	Ashasuni	1(Riverine flood)	11
Sirajganj	Kajipur	1(Riverine bank Erosion)	14
Chapai	Nachole	1(Drought)	13
Naogaon	Shapahar	1(Drought)	11
Pabna	Bera	1(Riverine flood)	10
Manikganj	Shibalay	1(Riverine flood)	13
Lalmonirhat	Aditmari	1(Riverine flood)	12
Total participation of officials in **15 I**nstitutional FGDs =			**184** officials