





Investigating the Exercises of ICTs for 2017 Flash flood Management in Haor areas of Bangladesh

Final Technical Report

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Background

Haor areas located at the northeastern part of Bangladesh now-a-days experience flash flood. Flash flood is the main disaster in the haor area which has main impacts on agriculture and thus threatens the lives and livelihoods of the people. Excess rainfall in the upstream hilly areas and subsequent runoff, sedimentation in the rivers, deforestation and hill cuts, landslide, improper drainage, unplanned road and water management infrastructure and the effect of climate variability are the main reasons for causing flash floods in this region. It happens in this area during the period of late march to May. However, in 2017 heavy rainfalls as well as onrush of water from the upstream Meghalaya hills in India have led to the inundation of vast areas of croplands of Haors and low-lying areas of the northeast. As a consequence, livelihoods in the haor areas face flash flood because of heavy downpour in the Meghalaya and Asham regions. Flood started on 27th March affecting six districts (Sylhet, Moulavibazar, Sunamganj, Habiganj, Netrokona and Kishoreganj) in the north east region (Figure 1). This early flash floods have wreaked on



Figure 1: Flash flood affected districts, April 2017 (Source: DDM)

haors spreading over six north eastern districts on the eve of the monsoon. Rising water overflow and breeched embankment in many places and inundated vast areas of croplands. This flood caused huge damage to crop production as flash floods are positioning the agricultural sector at significant risk (BWDB, 2014). Since, the paddy fields in hoar area remain under water for half of the year and in dry season, the farmers can only grow paddy

to feed them for the whole year. Therefore, the people of the affected areas are now in an utter shock as the flood waters came almost in lightning speed that have caused extensive damage to standing boro crop, fish stock and livestock. Boro crop has been completely damaged in this area. It destroyed nearly-ready-for-harvesting boro rice in about 160,170 hectors areas (Table 1). According to Ministry of Agriculture, the loss of Boro rice is estimated to be about 800,000 tons. Likewise, it is reported by the Department of Agriculture Extension (DAE) that 0.29 million hectares of boro has been cultivated in haor areas compromising of Sunamganj, Hobiganj, Sylhet, Moulvibazar, Netrakona and Kisoreganj districts. Among them, Sunamganj district is badly affected by flash flood where 91,690 hectares of cultivated land are submerged out of 229,082 hectares.

District	Affected	Affected	Affected		Fully	Damag	ed house
	Upazilas	unions	household	a	damaged gricultural land (ha)	Fully	Partially
Netrokona	10	86	167,180	19	9,566	0	0
Kishorganj	13	56	148,687	4	5,256	0	0
Habiganj	08	64	74,440	1	5,953	46	51
Sylhet	13	105	212,570	20	6,715	20	10
Moulovibazar	07	60	74,594	9,	,914	194	284
Sunamganj	11	88	172,617	1	02,436	2,600	15,000
Total	62	518	850,088		219,840	1,860	15,345

Table	1:	Im	pact	of	Flash	Flood
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(**Source:** DDM, 01 May, 2017)

Based on the above, this study considers the importance of ICT (Information and Communication Technology) for Disaster Risk Reduction (DRR) (UNAPCICT, 2010) as there is a growing awareness about ICT at present and it is one of the disaster tools. It can potentially play a pivotal role in disaster prevention, mitigation and management. ICT encompasses both traditional media (radio, television) as well as new emerging media (cell broadcasting, Internet, satellite radio, etc.) all of which can play a major role in minimizing the risks of a potential or impending disaster. Before disasters strike, ICTs are used as a conduit for disseminating information on an impending danger, thereby making it possible to take the necessary precautions to mitigate the impact of these disasters. Hence, it is crucial that there is consistency in the application of ICT for at risk areas in achieving effective DRR (Wattegama, 2007). In terms of flooding event, ICT plays an increasing role in different stages of flood disaster management including forecasting and prediction, early warning, mitigation, response and recovery as well as rehabilitation. For example, rapid estimation of inundated areas is critical to effectively manage response operations. Emergency managers

require timely and accurate information on areas affected by floodwater to priorities relief efforts and plan mitigation measures against damage. Nevertheless, it could be accomplished in flood disaster management through the uses of potential ICTs such as Remote Sensing, GIS, space technology, wireless sensors networks, satellite technology, mobile technology and social media.

All most all the developed countries are extensively using ICT and ICT based applications for managing natural disaster. In Bangladesh, although, there is well established ICTs at the national level, however, the extent of ICT implication at the community and institutional level remain poor. Moreover, a few numbers of ICTs such as television and mobile phone have been used to alert the community towards flash flood.

Objectives of the Study:

Based on the current scenarios of flash flood in 2017, the main objective of the study is:

- To figure out the exercise of ICT at different stages of the recent flash flood management such as: forecasting and prediction, early warning, mitigation, response and recovery as well as rehabilitation.
- To identify the gap of ICTs for the successful implementation of flash flood management at various levels.

Research Questions:

In order to achieve the objectives, the following research questions have been acquired:

- Is there any contribution/role/activities performed by ICTs both at community and institutional level to cope with different stages of flash flood management?
- If so, what are those activities and how those are playing role in flash flood management?
- What are the problems and constraints related to present forms of ICT to cope with flash flood management?
- What actions/changes should be incorporated to redesign the present forms of ICTs to mitigate with flash flood?

Study Area:

The study area consists of Bishwamvorpur and Tahirpur upazila of Sunamganj, district which are positioned at the greater haor basin in the northeastern part of Bangladesh (Figure 2). These are prone to flash floods due to heavy rain in the upper reaches of watershed lying across the national boundary in the Indian Territory. In 2017, Bishwamvorpur and Tahirpur upazila of Sunamganj is rigorously affected by early flash flood than the other haor districts in northeastern part (Table 2). In this study, the study area has been taken the same (Bishwamvorpur and Tahirpur upazila of Sunamganj) as it identified the extent of use of ICT at institutional level for flash flood management in previous study. To fulfill the objectives, the research has been carried out at this two upazila of Sunamganj district. Most of the people living in the study area are now severe distress as they have lost their one seasonal rice crop. According to DAE (2017), the estimated total loss of potential rice crop is 354,840 MT and in monetary terms estimated loss amounted to BDT is 10,645.2 million.



Figure 2: The study area showing Tahirpur and Bishwamvorpur upazila in Sunamganj district

Upazila	Total area under	Damage of standing	Remark
	<i>Boro</i> cultivation (ha)	Boro field (ha)	
Dharmapasha	31,800	18,610	Ajarkhali, Shoytankhali, Marardair,
			Haldirbodh, Ulashkhali and Balrampur
			embankments were damaged
Sadar	16,200	10,300	Tolakhalu and Teukhali
			embankmentwere damaged
Tahirpur	18,400	7,610	Alamkhali, Dorondadh and Mahalia
			were affected
South	22,275	5,560	Shallardair embankment was damaged
Sunamganj			
Jagannathpur	20,207	12,190	Burakhali, Tanguar, Betauka, Falgida,
			Demakhali and Katagang embankment
			collapsed and water logged
Dirai	28,000	6,740	Kadipur, Tufankhali, Baram, Tangni and
			Boishakhi embankment were damaged
Shalla	22,000	2,120	Joaria embankment were damaged
Doara Bazar	13,680	6,930	
Chatak	14,240	9,830	Water logged due to damage of
			Lakhsmibaul
Jamalganj	25,190	6,010	Water logged due to damage of Kalibari
			Point
Diswambharp	11,090	5,790	Gondamara and Jiragtaherpur
ur			embankment collapsed
Total	229,082	91,690	

Table 2: Detailed Impact of Flash Flood in Sunamganj District

(Source: DDM, 2017)

Methodology:

To acquire information related to flash flood and exercises of ICT in 2017 flash flood, this study utilized different approaches to collect primary as well as secondary data. However, to achieve the objectives, this study pursued the following steps (Table 3). Firstly, research related literature have been collected to gain preliminary understanding of ICT, forms of ICT, implication of ICT for flash flood reduction. Secondly, focus group discussions, key informants interviews have been conducted through various stakeholders in the study area to get primary data.

Time period	Prime aspect of data collection	Instrument and method of data collection	Target group
6 July to 9 July 2017	• To figure out the exercise of ICT at different stages of	 Key Informants interview 	Government officials, NGO people, School
19 September to 22 September	the recent flash flood management	 Focus group discussion 	and College teacher, local leader, Elected
2017	• To identify the gap of ICTs for the successful implementation of flash flood management at various levels		member, Mosque Imam, Journalist, farmers et.

Table 3: Methodology of the study

Results and discussion

As we know that the disaster management in any region is based on cyclic steps and this cycle involves four key phases i. e. mitigation, preparedness, response and recovery. These four phases usually overlap. Therefore, this study disclosed how ICT is being used in all the phases of flash flood management 2017 in the study area. In an emergency situation like disaster events, effective communication and collaboration are the major issues. Responding emergency situations is not such an easy task. Responding efforts efficiency can be enhance by adopting ICT at the time of handling emergency situation like natural disaster management. In terms of response, therefore, this section highlights the sources of information that pass through ICTs at various levels.

Based on the key interviews, it has been noticed at the institutional level:

The governmental response is prompt and significant. The government at central level, district level has various roles to play during the disaster situation. Now the voluntary sectors like non-government organizations are also becoming increasingly important because of the various functions they can perform. However, it has been seen from the study area that the flash flood early warning system is issued by flood Forecasting & warning centre (FFWC) of BWDB when the river water level goes more than 1 m above the danger

level. This information is also disseminated by PM office and DDM through fax, video conference and email to the district level. The District Disaster Management Committee (DDMC) then passes this information to Upazila Disaster Management Committee (UzDMC) through video-conference, cell phone, group sms/email, district web portal, facebook etc. With the help of cell phone, group sms/email, further, this warning information goes to Union Disaster Management Committee (UDMC) and UDMC circulates this emergency information to the flash flood affected people by cell phone. Figure 3 shows the flow diagram of flash flood early warning system disseminated at the study area.



Figure 3: Mode of flash flood warning information to national to local level

In addition, Department of Agricultural Extension (DAE) gets the flash flood warning message from Bangladesh Meteorological Department (BMD) by email, fax and cell phone. Then they circulate this information directly to upazila agricultural office through email, telephone and cell phone. Upazila agricultural officer passes this information to subassistant agricultural officer (SAAO) through cell phone, group sms that ultimately reaches to the affected community, farmer in the study area. Figure 4 shows how the farmer and community people in the affected area get the message pre-, during and post flash flood situation.

In terms of response and recovery, it has been further seen from the study area that the government has taken up a special support program for 100 days for the flood victims with 100 kg of rice and Taka 1,500 cash for each family to buy essentials. In addition to this, the regular vulnerable group feeding (VGD) and the gracious relief (GR) programs would go

hand in hand. The supports include: waiver of the interest on agriculture loans, distribution of fertilizers, seeds and other agriculture inputs, distribution of rice and cash, subsidy for electricity, and to take a long-term master plan to turn the haor areas into an economic resource hub. In this recovery process, ICTs are actively involved by fax, email, cell phone and group sms.



Figure 4: Information dissemination by DAE during Emergency

In terms of mitigation and preparedness, it has been addressed by Deputy Commissioner of Sunamgonj that initiatives have been taken to make digital Bangladesh. For this, they have taken activities to bring all the administrative offices such as DC office, all UNO offices, all ac land offices, officers club, heritage and archeological places, cultural centres and public library under WiFi connection. They give emphasis on the more effective and efficient use of UDC (Union Digital Centre) and PDC (Pouroshova Digital Center). Therefore, they facilitate to strengthen the UDC and PDC as digital outlet for providing services.

Radio Sunamganj has been started on 4 October 2017 that will contribute the livelihood improvement of haor people through the broadcasting of the education, health and agriculture related information. During a flood event, it can be used for flash flood warning systems. Haor community keep listening to local radio station for information, updates and advice to cope with flash flood arises in their locality.

To build community resilience towards flash flood, table 4 mentions the summery of the activities those have been done through ICTs.

	Disaster	Activities	Exercises of	Sources
	Phase		ICT	
Pre	Mitigation	• Motivation and	Email	DDMC,
disaster		awareness	Whatsapp	UzDMC,
		• Establishment of green	facebook	UDMC
		belt through	Mobile phone	LGED
		afforestation (Hijol,	Television	DAE
		Koroch)		
		Farm mechanization		
	Preparedness	Education	Mobile phone	DDMC,
		Awareness building	email	UzDMC,
			television	UDMC
			Sunmagonj	
			radio	
During	Response	Early warning	Mobile	DDMC,
disaster		• Relief (Food, cloth, seed)	Voice call	UzDMC,
			sms	UDMC
				DAE
				Islami bank
Post	Recovery	Fair rice price	Mobile	DDMC,
Disaster		Infrastructure	• email	UzDMC,
		development,		UDMC
		• Cash, agricultural		LGED, BWDB,
		incentives		DAE

Table 4: Flash flood management activities performed by various sources through ICT

From the focus group discussion and key informant interview (KI) at the community level: It has been reported that in 2017 flash flood the early warning, forecasting and information dissemination was very poor. Although it is evident from the institutions that information dissemination is much better than the previous year flash flood.

The voices came from the focus group discussion and KI at community level further revealed that various means of initiatives regarding protection of flash flood water especially construction and maintenance of dam and embankment is much important than the flood forecasting and warning information dissemination. They also noticed that group sms and voice mobile call is the suitable options for quick information dispatch among the community. It is also notable that during disaster period emergency response in the form of relief is crucial for the survival of the community, though some of the victims received relief via food and monetary help which is not sufficient for all of them. In case of post disaster

recovery, they want agricultural inputs such as seeds, fertilizers and agricultural machineries for their existence and survival.

In addition, it is revealed from the FGD and KI at community level that early flash flood warning information dissemination at the community level is still very weak and sometimes far behind. It is mentioned worthy that it is utmost important to further improve the system in terms of the warning message content, communication, institutional dissemination pathways, end users response. For instance, increasing the number of recipients of mobile call and volunteers, increasing the frequency of messages, repeating important parts of the message and disseminating at specific times of the day. Furthermore, if provide warning sms then the content these sms should include more location specific information with inundation depths, increased lead times and an outlook (action orientated) message.

Challenges of ICT establishment for flash flood management

Based on the KI and FGD (Focus Group Discussion), the main challenges are

- Unpredictable in nature: The nature, behavior and dimension of flash flood are unpredictable in nature. It may vary both spatially and temporally. Climate change is one of the main drivers to enhance the process of unpredictability.
- Lack of professionalism: Right people are not in right position. Furthermore, the study area is situated in the remote location. Hence, most of the officials are reluctant to their official task, although they are very active during the emergency period.
- Power failure: Power failure, severe breakdown in power supply and frequent cutoff often damaged or destroyed communication networks would lead to a complete communications blackout in the affected areas. Even if part of the communications system were still operational, it could quickly become overwhelmed by increasing traffic volumes at the time of the disaster.
- Poor infrastructure in Net facilities and maintenance: Poor broadband net facilities and maintenance are very limited at Sunamganj district and at upazila level is very poor. However, recently Deputy commissioner of Sunamganj tries his level best to improve the situation.
- Lack of transparency: Transparency especially in the process of construction and procurement is limited. Task distribution and monitoring are also poor.

Conclusions

It is impossible to predict natural disasters like flash floods. However, disaster management preparedness plans help to reduce the adverse impacts of flash flood on human life and socioeconomic conditions. In Bangladesh, flash flood mainly causes loss of standing crops. Besides, it affects households due to loss of fisheries and domestic animals and birds. Moreover, some households have lost their houses (fully or partially). With this connection, ICT plays a critical role in environmental monitoring to predict and detect natural disasters and provide warnings of their occurrence and also in the aftermath of a disaster by ensuring the timely flow of information needed by citizens, government agencies and those aid organizations involved in rescue and recovery operations and providing medical assistance to the injured.

In this study, it is clear that ICT has been practiced as mobile phone, SMS facilities and connecting via mobile phones, which were seen as an important measure in responding to disasters. Although a good ICT infrastructure is in place in Bangladesh, however, there is yet no comprehensive well-defined system in the country to designate the institutions and their responsibilities for emergency communication in a post-disaster situation.

In the previous study, it explores that ICT tools have been started in almost all phases of disaster management. Moreover, the extent of uses of ICT for flash flood reduction at institutional as well as community level is poor. To improve the situation in climate change context, it is utmost important to accomplish ICTs towards flash flood management. This study recommends:

- The potential of the existing Union Digital Centres (UDC) and Disaster Management Information Centres (DMIC) at the Department of Disaster Management (DDM) should be utilized together with the local Bangladesh Water Development Boards (BWDB) offices,
- To move to a more decentralized process for warning generation, interpretation and dissemination.
- A warning communication strategy is required between the key institutions FFWC (BWDB), DDM and the NGOs for consistent and effective warning dissemination.
- To enhance the effectiveness of communities' response, further awareness raising and knowledge sharing, financial and resource support mechanisms are needed at the local level with assistance of all types of local stakeholders.

Annex I: Pictorial view of field activities



Focus Group Discussion



Interview of GOs



Interview of Deputy Commissioner



Interview of GOs



Discussion with DC Sunamganj



Discussion at DC Office, Sunamganj



Interview at Community



Intervew of Journalist



Interview of DAE personnel



Interview at Farmers' Field



Interview at community