Journal of ——
Civil Engineering
—— IEB

Evaluation of the implementation of SOD for some affected upazilas of Bangladesh during the 2009 cyclone Aila

Md. Sadequr Rahaman[1], Md. Younus Mia[1,] Mehedi Ahmed Ansary[2] and Niger Sultana[1]

[1]*Department of Environmental Science and Resource Management*
Mawlana Bhashani Science and Technology University, Tangail 1902, Bangladesh
[2]*Department of Civil Engineering*
Bangladesh University of Engineering and Technology, Dhaka 1000, Bangladesh

Abstract

The study has been undertaken to evaluate the implementation status of Standing Orders on Disaster (SOD) during the 2009 Cyclone Aila at Shyamnagar Upazila of Satkhira, Koyra and Dacope Upazilas of Khulna. The implementation of SOD at Upazila, Union and community level was evaluated by three staged study method. The study indicated that the SOD was partially implemented during Aila. Maximum respondents of UzDMC (Upazila Disaster Management Committee) and UDMC (Union Disaster Management Committee) confirmed that the orders were implemented considering the existing SOD as a base order and instant strategies were also applied. The UzDMC provided about 86% services where about 82% by the UDMC where about 74% SOD was implemented at root level during Aila. A number of respondents of all DMC (Disaster Management Committee) also commented about the lacking of SOD at every stage. About 35% respondents of UzDMC, 15% of UDMC and 16% respondents of general people said that the effects of Aila could not be reduced. About 35% respondents of UzDMC, 42% of UDMC and 44% respondents from general people confirmed that there was lacking of managing Aila at during stage. About 50-60% disaster recovery has found and most of the respondents think the loss of lives and environment is unrecoverable though coastal afforestation and alternative livelihood programs are running. The average monthly income before Aila was about 6333Tk (USD 81) and at present time it is about 5333Tk (USD 68). The average gross condition of 67% respondents was good before Aila and 94% was in worse condition during Aila. Currently, this condition is becoming better which was confirmed by 39% is the highest portion. Most of the respondent said that the loss of lives and properties could be minimized if a strong structural setup, available cyclone center, kella (Manmade high land like a small hill) and accurate warning and preparedness would be existed.

1.   Introduction

Bangladesh is one of the most disaster prone nations in the world. Natural disaster disrupt the nation's food supply and decimate the livelihoods of the many Bangladeshis who work in agriculture (Khan 2013).The impacts of climate variability and change are global concerns, but in Bangladesh, where large parts of the population are chronically exposed and vulnerable to a range of natural hazards, they are particularly critical (FAO 2006).

The impacts and vulnerabilities of disasters could be minimized through proper disaster management planning and by integrating disaster management activities with local and national development plan (Rashid 2008). Considering the vulnerability and disaster risk reduction a new version of SOD was finalized (SOD 2010). SOD describes in detail the roles and responsibilities of different committees, ministries and other organizations involved in disaster related activities. It is key document which is followed by all concerned organizations in Bangladesh (Habib 2009).

Munshigonj, Burigoalini, Gabura, Atulia and Burulia Umions
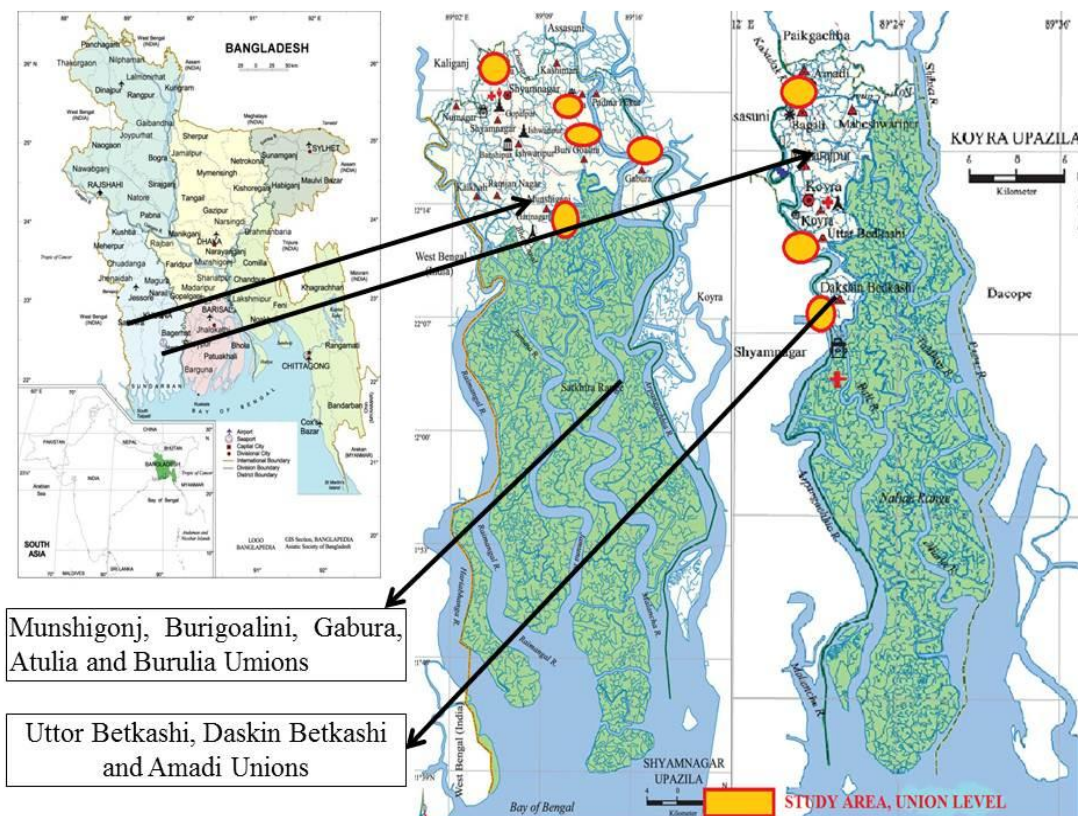
Uttor Betkashi, Daskin Betkashi and Amadi Unions

Fig. 1. Study Area in Map.

The Standing Orders on Disaster in the current format was first published in 1997 in Bengali. It was modified and translated in English in 1999. New features introduced in this edition. Conceptually, this edition follows a comprehensive approach emphasizing risk reduction as well as emergency response relating to all hazards and all sectors. Consequently, it has to be followed not only at disaster time but also at normal times (SOD 2010). Aila, category 1 cyclone, hit South-Western coastal region of Bangladesh on 25 May 2009. The cyclone took shape on 23 May and dissipated on 25 May 2009 in the coastal region of Bangladesh (UO 2010). As of 29 May, government figures indicate that 3,709,334 people have been affected in 15 coastal districts, with 147 dead and 1,131 missing. Up to 230,208 houses were

reportedly destroyed while those partially damaged stand at 315,018. The amount of damaged crops was estimated to be 340, 660 acres (DREF 2009). Though Bangladesh is a most vulnerable country of disaster and a well-organized and pre-structured order and response system is present in inter sectorial policy but yet the analysis of the effectiveness and the evaluation of those structured order systems for a specific disaster in the disaster prone area were not evaluated. But the evaluation study of current SOD for a specific disaster like Aila was the need of time. Therefore, the objective of the study was to evaluate of the implementation of SOD for affected Upazilas of Bangladesh during the 2009 Cyclone Ailaat Shyamnagar Upazila of Satkhira district, Koyra and Dacope Upazilas of Khulna district along with the Aila recovery trends among the community people.

2.   Study area

The Cyclone Aila furiously hit the Satkhira and Khulna Districts of Bangladesh especially on Shyamnagar Upazila of Satkhira, Koyra and Dacope Upazilas of Khulna were affected mostly. Five Union of Shyamnagar (Munshigonj, Burigoalini, Gabura, Atulia and Burulia) and three unions of Koyra (Uttor Betkashi, Daskin Betkashi and Amadi) were selected as study area (Figure 1).

3.   Data collection and analysis

Table 1
Profile of the Respondents

Indicators	Variable	UzDMC*	UDMC**	G. Inhabitants
Sex	Male	14	15	29
	Female	0	4	7
Location of the respondent	Resident	0	0	26
	Nonresident	0	0	6
	Management Body	9	0	4
	Resident+ Management Body	5	19	0
Marital status	Married	14	19	33
	Unmarried	0	0	3
Age range in year	18-30	0	0	5
	31-42	5	7	9
	42-54	7	7	17
	More than 54	2	5	5
Educational qualification	Uneducated(Under primary)	0	3	22
	Educated(Up to graduation level)	5	15	8
	Higher Educated (More than graduation)	9	1	4
Occupation	Farmer	0	7	7
	Fisherman	0	8	8
	Housewife	0	7	7
	Employee	12	3	3
	Management Bodies	2	4	4
	Others	0	7	7
Relationship between Aila and respondents	Victim	0	0	25
	Visitor	0	0	2
	Management Bodies	14	2	3
	Specialist	0	0	4
	Victim+ Management Bodies	0	17	2

*UzDMC-Upazila Disaster Management Committee **UDMC-Union Disaster Management Committee*

Implementation of SOD was evaluated by applying an integrated research method. The data were collected by reconnaissance field survey, questionnaire survey, the institutional survey

and also help of published paper of the relevant topic for identifying the gaps. More information on the problem to be investigated collected from different sources like available books, websites, reports and study of NGOs etc. Respondents were randomly selected for questionnaire survey.

Respondents were selected from the members of the Union Disaster Management Committees, Upazila Disaster Management Committee and general in habitants through three structured questionnaire.

4.   Result and discussion

4.1   Profile of the respondents

There 14 members from Upazila disaster management committee, 19 member from union disaster committee and 36 member from general inhabitants were selected as respondents for this study. Their profile of sex, age, educational qualification, occupation and the location have shown in Table 1.

4.2   Average performance evaluation of SOD at warning stage

Maximum respondents of three stages members sated that the warning was disseminated before disaster. Deferent organizations such as the NGOs, private sectors and local community are engaged for disseminating the warning, visiting emergency shelters, reviewing water supply sources, conducting mock and preparation of checklist. Most of the study respondents of Upazila and Union Disaster Management Committee were involved here. But the SOD could not implemented accurately due to lack of updated technology and available resources of disaster management. The overall finding about the applicability of SOD and the positive outcome during Aila at warning stage is not negligible (Table 2).

Table 2
Evaluation of SOD at warning stage

Questions	UzDMC in %		UDMC in %		General Inhabitants in % Having warning message	
	Yes	No	Yes	No	Yes	No
1. Dissemination of Warning?	100	0	89.48	10.53	86. 11	13.89
2. Engaging organizations for disseminating warning?	85.71	14.28	84.21	15.79	77. 78	22.22
3. Visit the emergency shelter center?	71.43	28.57	84.21	15.79	-	-
4. Reviewing water supply source?	92.86	7.143	73.68	26.34	-	-
5. Conducting a mock of water purification?	92.86	7.14	73.68	26.32	-	-
6. Reviewing the stock of life savings materials?	78.57	21.43	57.89	42.11	-	-
7. Reparation of checklist of emergency works?	100	0	78.95	21.05	-	-
Average Performance at Warning Stage	88.78	11.22	77.44	22.56	81.94	18.06

4.3   Average performance evaluation of SOD at disaster stage

The respondents of UzDMC and the UDMC said that they provided services according to the written agenda of SOD during Aila. According to the UzDMC, 87% services were provided with 8 STDEVA where the UDMC provided 79% services with 13 STDEVA. The general people said that they received 64% services at during stage of Aila with 10STDEVA (Table 3).

Table 3
Implementation SOD among general inhabitants at disaster stage

Questions	UzDMC in %		UDMC in %		General Inhabitants in % (Having the Services)	
	Yes	No	Yes	No	Yes	No
1. Organizing emergency rescue?	100	0	100	0	83.33	16.67
1. Coordination at all relief activities?	85.71	14.29	84.21	15.79	75	25
2. Protecting people from rumor?	92.86	7.14	73.68	26.39	52.78	47.22
3. Ensuring security of relief workers?	78.57	21.42	68.42	31.58	58.33	41.67
4. Ensuring security of gender?	78.57	21.43	68.42	31.6	69.44	30.55
5. Protecting environmental degradation?	85.71	14.28	89.47	10.52	52.78	47.22
6. Transferring essential resources to the people?	78.57	21.43	63.16	42.11	63.89	36.11
7. Preparing water purification technology?	85.71	14.28	89.47	10.52	58.33	41.67
8. Operating EOC?	100	0	-	-	-	-
Average performance of providing and receiving services	87.3	12.60	79.60	21.06	64.24	35.76

4.4   *Average performance evaluation of SOD at post-stage of Aila*

According to the respondents of UzDMC 83% services were provided with 9 STDEVA where UDMC provided 90% services with 7 STDEVA. According to the answer of general people they received 77% services with 11 STDEVA at post stage of Aila (Table 4).

Table 4
Status of Response at post-disaster period

Questions	UzDMC in %		UDMC in %		General Inhabitants in % (Having the Services)	
	Yes	No	Yes	No	Yes	No
1. Collection of statistics of loss?	100	0	100	0	-	-
2. Providing data to upper level DMC?	78.57	21.43	100	0	63.89	36.11
3. Planning the rehabilitation work?	78.57	21.43	89.47	10.53	-	-
4. Steps for distributing articles?	100	0	94.74	5.26	-	-
5. Supervising and keeping account of relief?	85.71	14.29	100	0	-	-
6. Helping the displaced people for coming back?	85.71	14.28	89.47	10.52	91.67	8.33
7. Counseling the psycho-traumatize people?	92.86	7.14	89.47	10.52	75	25
8. Helping the injured people not to fear?	78.57	21.43	78.95	21.05	-	-
9. Arranging lesson learning session?	64.29	35.71	78.95	21.05	80.56	19.44
Average performance of providing and receiving services	83.03	16.96	90.13	9.86	77.78	22.22

4.5   *Overall performance evaluation of SOD of three stages of Aila*

From the above equations of performance evaluation of SOD, it can be found that about 86% SOD was implemented by UzDMC during Aila (Equation 1) where about 82% by UDMC (Equation 2). Here the performance rate of UzDMC is higher than the UDMC where about 74% SOD was implemented at community level (Equation 3).

Average performance evaluation of disaster management committee during Aila is

$$= \frac{Average\ performace\ at\ (warning + during + post) stage\ of\ Aila}{3}$$

$$= Overall\ Performance\ in\ Percentage$$

According to the UzDMC, the average performance at three stages is

$$\frac{(88.78+87.30+83.03)}{3}\% = 86.37\% \tag{1}$$

According to the UDMC, the average performance at three stages is

$$\frac{(77.44+79.60+90.13)}{3}\% = 82.39\% \tag{2}$$

According to the general inhabitant, the average received services at three stages is

$$\frac{(81.94+64.24+77.65)}{3}\% = 74.65\% \tag{3}$$

4.6 People's perception about orders

More than fifty percent (about 78%) respondents of UzDMC and 73% of UDMC said that there was no lacking at warning stage but 21% of UzDMC members and 26% of UDMC members said the warning has disseminated but it might be earlier and accurate. Some respondents mentioned that the warning system was as usual and most of the time it was not accurate and calculative. Some respondents mentioned that the manpower, forecasting power and capacity building might be increased. Fifty percent general inhabitants said that there was no lacking of warning system, about 41% respondents said that they might get the early warning and some of them denied of getting the warning.

Table 5
People's perception about orders

Questions		General Inhabitants	
		Yes (%)	No (%)
1.	Experiencing Aila?	83.33	16.67
2.	Knowledge about SOD?	75	25
3.	Implementation of SOD properly?	52.78	47.22
4.	Getting evacuation orders?	58.33	41.67
5.	Sufficiency of evacuation mission?	69.44	30.56
6.	Getting any response?	52.78	47.22
7.	Abide by orders?	63.89	36.1 1
8.	Satisfaction about taken steps?	58.33	41.67
9.	Any objection about signal, orders and recovery steps?	44.44	55.56

		UzDMC in %		UDMC in %		G. Inhabitants in %	
		Yes	No	Yes	No	Yes	No
Lacking of SOD at	Warning stage?	21.43	78.57	26.32	73.68	41.67	58.33
	Disaster stage?	35.71	64.28	42.11	57.89	44.44	55.56
	Post Stage?	14.28	85.71	10.52	89.47	8.33	91.67
Possibility to reduce loss?		64.28	35.71	84.21	15.79	83.33	16.67

According to the local people the warning from Kolkata is more reliable and accurate than the warning from Bangladesh meteorological department.

Table 6
Sector wise loss, supports, recovery and gross condition of Aila affected people

	Indicators	No Loss	Partial	Devastating
Person wise most affected sector	Human lives	50	36.11	13.89
	Households	8.33	41.67	50
	Domestic Animals	25	33.33	41.67
	Crops and Land	36.11	30.56	33.33
	Roads and Others	25	36.11	38.89
	Natural Environment	0	30.56	69.44

		Supportive Group	Yes (%)	No (%)
People's Perception about responses	Support and Response	GO	75	25
		NGOs	86.11	13.89
		Private	36.11	63.89
	Awareness of local DMC	GO	91.67	8.33
		NGOs	86.11	13.89
		Private	25	75

	Variables	Percentile Values
Percentile Recovery of Aila at present	0-20%	5.56
	21-40%	19.44
	41-60%	25
	61-80%	22.22
	81-100%	19.44

	Indicators	Variables	Percentile Values
Gross Condition	Before	Good	66.67
		Worse	0
		As Usual	33.33
	During and After	Good	0
		Worse	94.44
		As Usual	5.56
	Present	Good	19.44
		Worse	16.67
		As Usual	19.44
		Increasing	38.89
		Better than Past	5.56

It may cause of technological dis-advancement of Bangladesh meteorological department. Member of UzDMC (64%), members of UDMC (57%) and general inhabitants (55%) said that there was no lacking to implement SOD and their management activities. Some of them said the rescue system and emergency services were provided to delay but they got. In Shyamnagar and Koyra Upazila the Emergency Operation Center were set-up and the information and necessary orders were provided from there and total field level monitoring

were performed from there. None of the members of UzDMC opposed and denied this (Table 5).

4.7 Sector-wise loss

There was a huge loss of life and properties during Aila. The respondents of UzDMC, UDMC and local inhabitants said that the loss of properties and life could be reduced. About 64% members of UzDMC, 84% members of UDMC and 83% inhabitants said that the loss could be minimized but the 35% members of UzDMC, 15% of UDMC and 16% inhabitants were denied that. Some of them claimed that there was an existing SOD but the precautionary measures about a disaster were so negligible.

During Aila there were only 20 cyclone center at Shyamnagar Upazila for more than 313781 people. Now it is 39 which are insufficient for more than 318254. There were only 22 Cyclone center during Aila out of 193931 people at Koyraupazila and now it is 43 which still insufficient (BBS 2011 and EPPC 2010). The respondents who provided positive answer said that if there were enough cyclone centers and the path of easy evacuation the life loss would be less than really occurred. Some respondents said there is no high land for the domestic pets and birds. The local people, livestock officers and the local govt. engineer said that cyclone center were made for saving the people from disaster but there were no kella (High land area made of soil, manmade hill) for protecting the domestic animals. If there were sufficient kella the loss of domestic lives and properties would be reduced. The forecasting system could be updated and accurate. The people of coastal region are mostly illiterate so they damn care the signal and they do not want to go cyclone center during signal period from their house. If they become educated then they will aware and the loss will be least in future.

4.8 Supports

About 75% respondents got Govt. support and 86.11% from NGOs and 36.11% got response from private or personal support where 25% said that they didn't get Govt. support. About 91%, respondents gave positive answer about Govt. support. From the study it was well-known that about 86% NGOs and 25% of local disaster management committees are aware about any type of disaster (Table 6).

4.9 Percentile recovery

After the devastating effect of Aila people could not recover totally. Only 25% respondents recovered about 41-60% which is the highest value. And 22% people, 19% people and other 19% people recovered 61-80%, 21-40% and 81-100%, respectively (Table 6).About 32% respondents recovered highest which is so satisfactory.

4.10 Monthly income

Due to disaster like Aila which impacts on the monthly income of the community. From the study it was noted that monthly income of the people did not increase after Aila (Figure 2). The average monthly income before Aila was 6333.82 Tk which decreased to 3278.07 Tk at during stage of Aila and 4611.58 Tk at after Stage of Aila. At present the average monthly income is 5333.83 Tk which is about 14% less than before Aila. So the economic recovery has not yet been completed there.

4.11 Recovery trends

In recovery trends in question of gross condition calculation, 66% respondents said that their condition was good before Aila and 33% said as usual. This percent decreased to 0% as good

condition, 94% as worse condition and only 5% said about the as usual condition during and after Aila. At present, 19% said about the good condition, 16% said as worse condition, 19% said as usual condition of their own economic and social status. About 38% said the condition is improving to better and only 5% stated that their condition is better than past (Table 6).
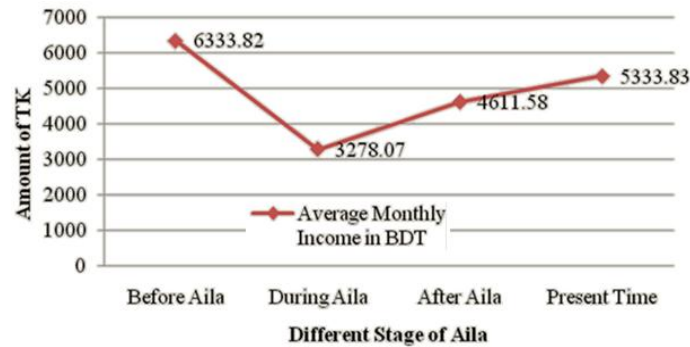

Fig. 2. Graphical representation of economic recovery

The percentage of good and as usual condition is not satisfactory. The worse condition also exists in the general inhabitants. According to the local respondents the gross condition before Aila was good for maximum respondents. But during and after stage the maximum number of respondents was in worse condition. At present maximum number of respondents said that there condition is increasing to better (Table 6). The recovery condition is partially satisfactory but the respondents of disaster management committees confirmed that middle class families are still now in vulnerable condition and more than 60,000 people have migrated to search employment (ECHO 2009). Most of them don't come back to their own residence.

5.   Conclusion

SOD is a rule which need to be followed in every stage of a disaster. Actually many things can be written in the documents but the implementation and the reality is so much different. With the help of the SOD a total work plan can be carried out. The SOD has been formulated considering the overall view of the country. During Aila the SOD was implemented partially and local strategies were also applied. In the warning session 100% respondents of UzDMC and about 90% respondents of UDMC said that SOD was implemented where about 86% local people confirmed that they got warning. There is a gap between the management bodies and general inhabitants. Most of the respondents of general inhabitants said that the main lacking of Disaster management is the backdated warning system. During disaster the lack of GO-NGOs and private sector coordination were found and mentioned by the respondents. Their house, farm, property and environment were damaged but with their mental strength they are trying to recover the effects of Aila. The Govt. and Non-Govt. organization also support them. Comparing the gross condition of these people at three stages, the condition is increasing to improve after Aila.

References
BBS (Bangladesh Bureau of Statistics), 2011, District Statistics, Satkhira, pp-33.
BBS (Bangladesh Bureau of Statistics), 2011, District Statistics, Khulna, pp-37.
DREF (Disaster Relief Emergency Fund), 2009, Bangladesh: Cyclone AILA, DREF operation n° MDRBD004, GLIDE n° TC-2009-000105-BGD, pp. 1-6.
ECHO, 2009, In-depth Recovery Needs Assessment of Cyclone Aila Affected Areas, pp-1-3.
FAO, 2006, climate variability and change in drought-prone areas of Bangladesh, Improved Adaptive Capacity to Climate Change for Sustainable Livelihoods in the Agriculture Sector – DP9/1-BGD/01/004/01/99, 5-12.

EPPC (Emergency Preparedness Plan for Cyclone), April 2013, Annex 5: List of Cyclone Shelter Centers, Department of Disaster Management, Ministry of Disaster Management & Relief, Government of Bangladesh.

Habib, M. A. 2009, Early Warning System for Severe Thunder Storms in Bangladesh, International Forum on Tornado Disaster Risk Reduction for Bangladesh 13-14 December 2009, Dhaka, Bangladesh.

IFRC, 2009, Review of the IFRC-led Emergency Shelter Coordination Group Cyclone Aila Response Bangladesh, Sandie Walton-Ellery, Dhaka, 2009, pp. 1-30.

Khan, A. I., 2013, Report on Functionality Assessment of Union Disaster Management Committees, Comprehensive Disaster Management Program (CDMP II).

Rasid, M. R. 2008, Implementing Standing Orders on Disaster (SOD) at Union Level: The Case of Kakua Union, Tangail District and Kazipur Union of Sirajganj District, Bangladesh, Postgraduate Programs in Disaster Management (PPDM)BRAC University, Dhaka, Bangladesh.

Standing Order on Disaster. 2010. Government of the People's Republic of Bangladesh. Ministry of Food and Disaster Management, Disaster Management & Relief Division, Disaster Management Bureau, pp. 1-10.

UO (Unnayan Onneshan), 2010, Cyclone Aila: One Year on Natural Disaster to Human Sufferings, pp. 1-10.