Gulsan Ara Parvin
Researcher, DPRI, Kyoto University

niruurp@yahoo.com

Date: July 26, 2018

Cyclone Warning and People`s Expectation-
A case study of Cyclone Aila Affected Area, Bangladesh

Gulsan Ara Parvin[1], Masashi Sakamoto[2], Shaw Rajib[3], Hajime Nakagawa[4], Anisul Haque [5]

[1] Researcher, Disaster Prevention Research Institute (DPRI), Kyoto University, Japan
[2] Project Officer, Pacific Consultant, Tokyo, Japan
[3] Professor, Keio University, Japan
[4]Professor and Director, Disaster Prevention Research Institution (DPRI), Kyoto University, Japan
[5.] Institute of Water and Flood Management (IWFM), Bangladesh University of Engineering and Technology (BUET), Bangladesh

Outline of the Presentation

Part 1: Bangladesh and Cyclone

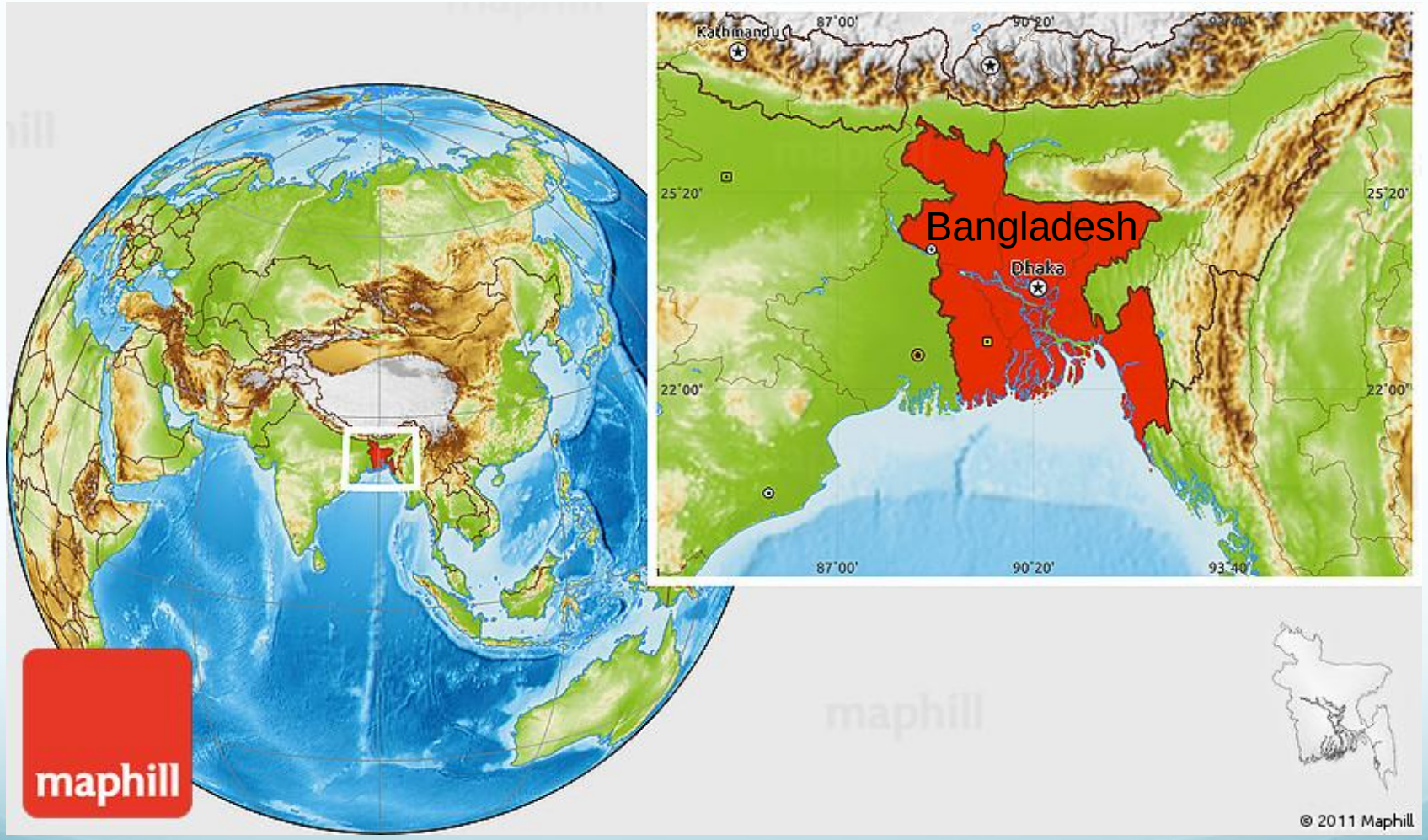
Part 2: Cyclone Warning in Bangladesh

Part 3: Modification in Cyclone Warning and Problems

Part 4: Cyclone Warning Scenario during Cyclone Aila

Part 1:
Bangladesh and Cyclone

Where is Bangladesh ???



Cyclone in Bangladesh ???

- Tropical cyclones with high winds and storm surges hit Bangladesh every three years on average (Saha, and James, 2017).
- About 6-10% of the world's tropical cyclones generate at the Bay of Bengal.
- Due to the geo-physical and topographical condition Bangladesh is one of the most disaster prone countries in the world. Especially, climate related disasters like flood and cyclone are most common in Bangladesh.
- Amon all disasters cyclones impose the most severe impacts in Bangladesh considering the loss of lives.
- According to Nicholls et al. (1995) during the past two centuries **42% of tropical cyclone-associated deaths have occurred in Bangladesh**.

How was the Loss of of Lives due to Cyclone ????

Cyclone Intensity and Human Casualty

Year	Cyclonic Wind Speed (km/hr)	Strom Surge Height (m)	Landfall Location	Landfall Timing	Number of Human Deaths
1960 (Oct)	201	3.05	Eastern Meghna River estuary near Noakhali,Bakerganj, Faridpur and Patuakhali	-	3000
1960 (Oct)	210	6.1	Chittagong, Noakhali, Bakerganj, Faridpur, Patuakhali and eastern Meghna estuary	-	10000
1961	161	3.05	Bagerhat and Khulna Coast	-	11468
1962	161	3	Feni Coast	-	1000
1963	203	5.2	Chittagong, Noakhali, Cox's Bazar and coastal islands of Sandwip, Kutubdia, Hatiya and Maheshkhali.	-	11520
1965 (May)	161	7.6	Barisal and Bakerganj	-	19279
1965 (Dec)	217	3.6	near Cox's Bazar and Patuakhali	-	873
1966	139	6.7	Sandwip, Bakerganj, Khulna, Chittagong, Noakhali and Comilla	-	850
1970	224	10	entire coast of Bangladesh	Afternoon	300000
1974 (Aug)	80.5	-	Khulna	-	600
1974 (Nov)	161	5.2	near Cox's Bazar and Chittagong	-	200
1975 (May)	112.6	-	Bhola, Cox's Bazar and Khulna	-	5
1985	154	4.6	Chittagong, Cox's Bazar, Noakhali and coastal islands (Sandwip, Hatiya, and Urirchar)	-	11069
1988(Nov)	162	4.5	Jessore, Kushtia, Faridpur and coastal islands of Barisal and Khulna	-	5708
1991	225	7.6	near the coast north of Chittagong port	Night (High Tide)	138882
1997	275	4.6	coastal islands and chars near Chittagong, Cox's Bazar, Noakhali and Bhola	-	155
2007	223	-	south-western coastal areas	Early Morning	3363
2009	92	-	south-west coast	Early Morning	190

Source : Department of Disaster Management, 2014

WHY Cyclone Warning ???

Cyclone Warning to reduce Human Casualty

- Cyclone warning is a non-structural mitigation measure that can reduce human casualty, loss and damage.
- If a cyclone warning can be issued timely with adequate information to the local people, it is possible to save life and property.
- Success of evacuation depends on the level of information given in the warning and how much 'believes' people have on this information.
- The most important issue is – whether the information given in the warning is 'useful' for the people.

Part 2:
Cyclone Warning in Bangladesh

How is Present Cyclone Warning System in Bangladesh ?

Related to Sea Ports

Signal No.	Location	Storm Condition	Storm Status	Comment
Distant Cautionary Signal No.1	Distant Sea	Squally Weather	Storm may form	
Distant Warning Signal No.2	Distant Sea	Squally Weather	Storm has formed	Signal No. 1 & 2 are same.
Local Cautionary Signal No.3	Port	Squally Weather	Storm has formed	
Local Warning Signal No.4	Port	Storm	Storm has formed	Signal No. 3 & 4 are same.
Danger Signal No.5	South of Ctg. Port East of Mongla Port	Severe Weather	Light or moderate intensity	
Danger Signal No.6	North of Ctg. Port West of Mongla Port	Severe Weather	Light or moderate intensity	Danger Signal No. 5, 6 & 7 are same.
Danger Signal No.7	Over the Ctg. Port Overt the Mongla Port	Severe Weather	Light or moderate intensity	
Great Danger Signal No. 8	South of Ctg. Port East of Mongla Port	Severe Weather	Great intensity	
Great Danger Signal No. 9	North of Ctg. Port West of Mongla Port	Severe Weather	Great intensity	Great Danger Signal No. 8, 9 & 10 are same.
Great Danger Signal No. 10	Over the Ctg. Port Overt the Mongla Port	Severe Weather	Great intensity	
Great Danger Signal No. 11	Communication with the meteorological warning center have been broken down. A DEVASTATING CYCLONE IS COMING !			

Present Cyclone Warning System in Bangladesh

Related to River Ports

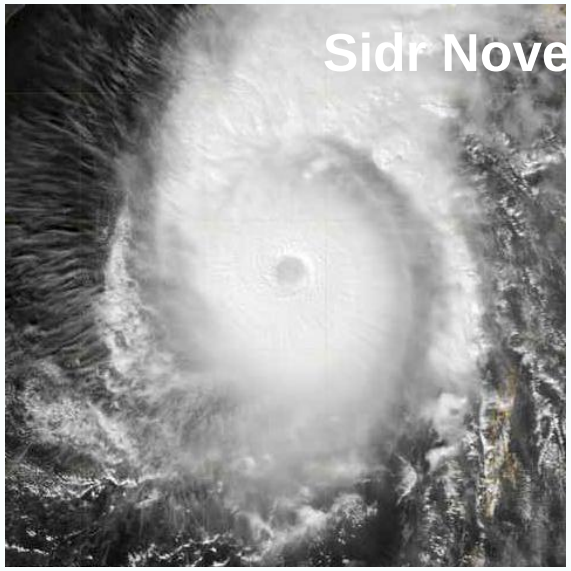
Signal		Meaning
Cautionary Signal No.	**1**	The area is threatened by squally winds of transient nature.
Warning Signal No.	**2**	A storm is likely to strike the area. Vessels of length ≤ 65 feet are to seek shelter immediately.
Danger Signal No.	**3**	A storm will strike the area. All vessels will seek shelter immediately.
Great Danger Signal No.	**4**	A violent storm will soon strike the area. All vessels will take shelter immediately.

Present Cyclone Warning System in Bangladesh

Present Cyclone Signal Dissemination Time

Stages of Cyclone Warning	Signal No.	Time to Forecast in Advance
Cyclone Alert Stage	Signal No. 1, 2 , 3	36 Hrs
Cyclone Warning Stage	Signal No. 4	24 Hrs
Cyclone Danger Stage	Signal No. 5, 6, 7	18 Hrs
Cyclone Great Danger Stage	Signal No. 8, 9, 10	10 Hrs

Problems in Present Cyclone Warning System in Bangladesh

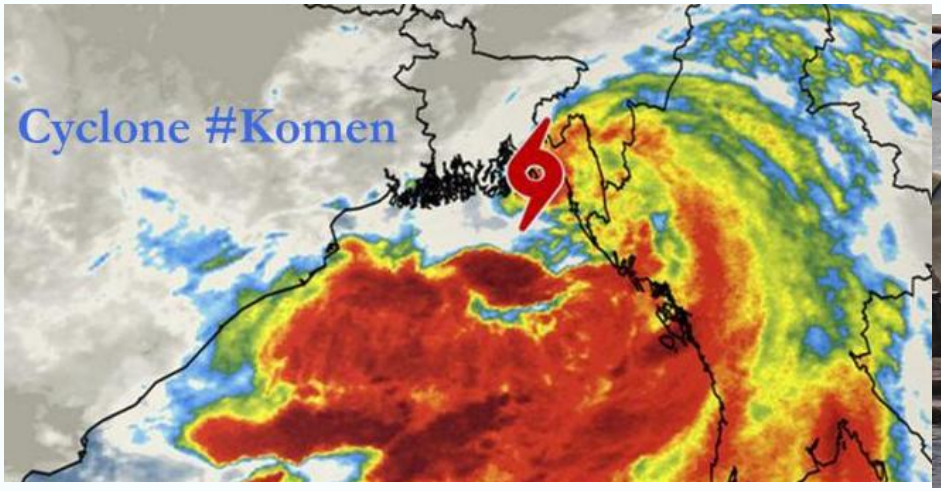


BMD warning for Cyclone 'Sidr'

November 15, 2007: Met office sounded great danger signal No. 10 for Mongla port and great danger signal 9 for Chittagong and Cox's Bazar as a severe storm in the Bay of Bengal is estimated to make landfall Thursday.

Only port names are mentioned – nothing is mentioned about the districts or upazilas

Problems in Present Cyclone Warning System in Bangladesh



BMD warning for Cyclone 'Komen' (July 30, 2015)

Chittagong and Cox's Bazar ports asked to maintain cautionary signal no. 7. Mongla and Payra ports to maintain cautionary danger signal no. 7. Coastal districts of Cox's Bazar, Chittagong, Noakhali, Laxmipur, Feni, Chandpur, Bhola, and their offshore islands and chars under danger signal no. 7. Coastal districts of Borguna, Patuakhali, Barisal, Pirozpur, Jhalokathi, Bagherhat, Khulna, Satkhira and their offshore islands under danger signal no. 5.

District names are mentioned in addition to port names but No Local Area Specific Information about Storm Surge Height or Cyclone Intensity

Problems in Present Cyclone Warning System in Bangladesh

This cyclone warning is generally criticized as

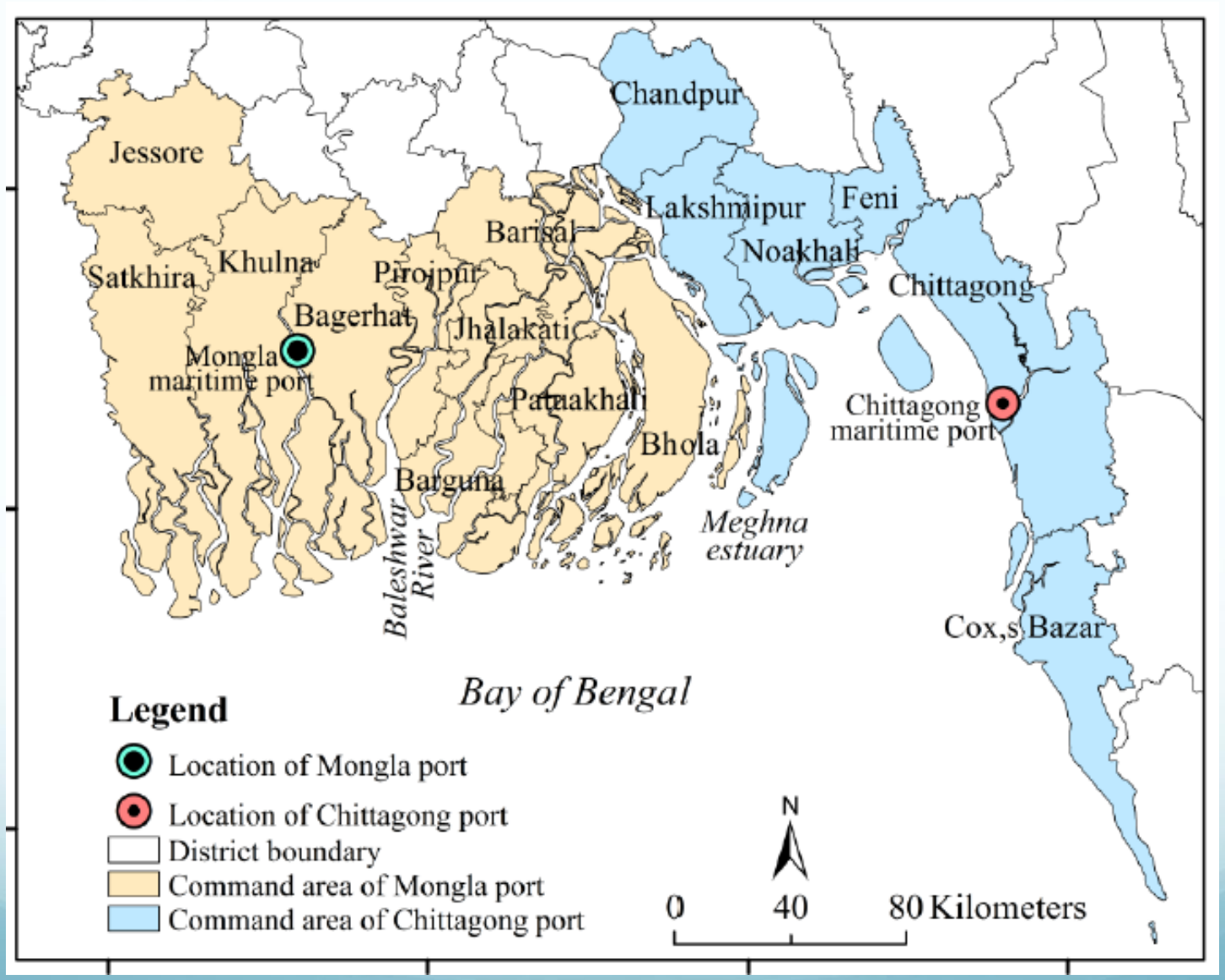
- Warnings are basically sea port oriented not local area specific
- Too much qualitative
- Language of the warning is not familiar to the local people

Part 3:
Modification in Cyclone Warning and Problems

Modification made by BMD in Present Warning System

- BMD is very sincere in this issue
- After two major cyclonic events of 1991 (1991 Chittagong cyclone) and 2007 (SIDR) several improvement measures are taken by BMD
- District specific signal numbers are issued with some quantification of surge depths and wind speed
- In a warning message, the coastal districts located to the west of the Meghna estuary lie in the command area of *Mongla* maritime port, while the districts located to the east lie in the command area of *Chittagong* maritime port

Modification made by BMD in Present Warning System



Modification made by BMD in Present Warning System

Signal		Wind Speed (km/hr)
Cautionary Signal No.	**2**	20 - 40
Warning Signal No.	**4**	41 – 61
Damage Signal No.	**6**	62 – 87
Great Signal No.	**8**	88 – 117
Great Signal No.	**9**	118 – 170
Great Danger Signal No.	**10**	More than 171

Modification made by BMD in Present Warning System

The Bangladesh Department of Disaster Management (DDM) has recently developed three mobile-network-based warning message dissemination methods

1. Cell Broadcasting System can be used to send warning messages to a targeted population group that is, residents in the coastal areas.

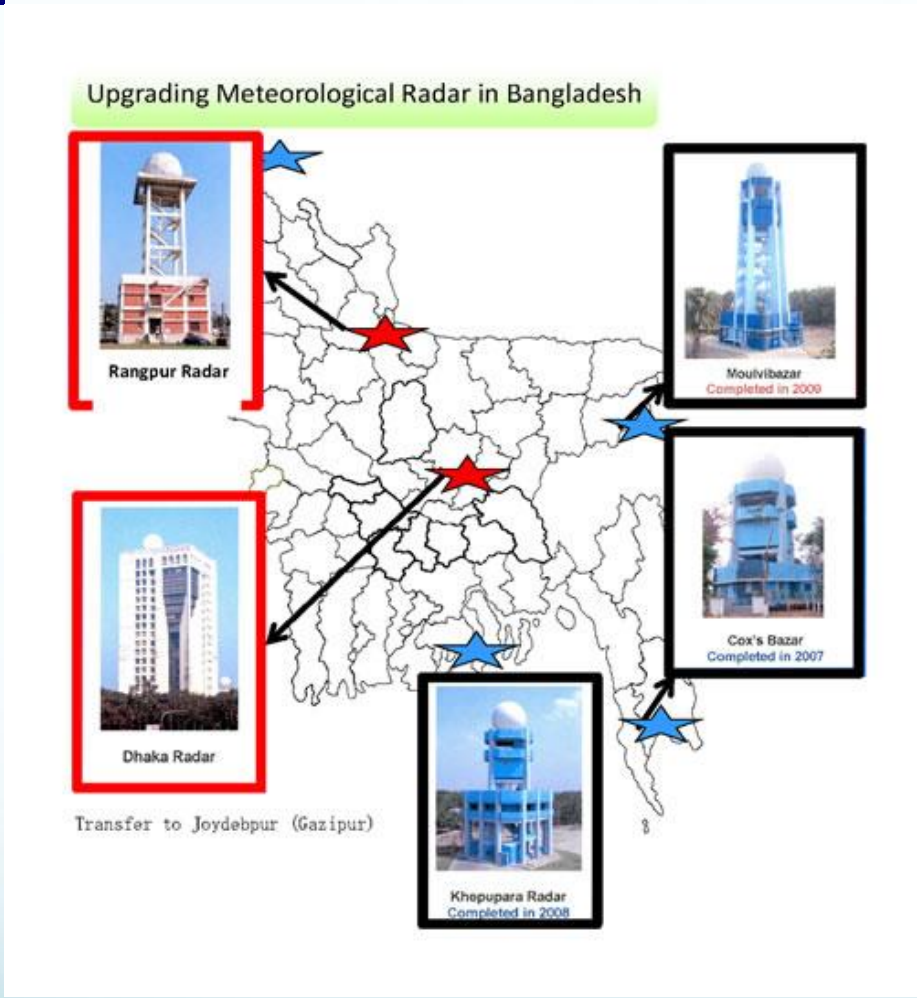
2. Interactive Voice Response is a method where residents can listen to a recorded warning message by calling a number.

3. Short Message Service is a text messaging service, which is specially designed for field-level disaster management committees. Members of these committees continuously receive updated information about the approaching TC on their mobile phones in cyclone emergencies.

Source:

Roy, C., S. K. Sarkar, J. Åberg and R. Kovordanyi. 2015. The current cyclone early warning system in Bangladesh: Providers' and receivers' views. *International journal of disaster risk reduction* 12: 285-299.

Doppler Radars–Grant of JICA



- Since 1988, Japan has been contributing to improving the weather forecast service in Bangladesh through establishment of meteorological radars, improvement of weather analysis & forecasting system and capacity buildings.
- All radars will be equipped with S-band Doppler radars.
- Doppler radars can collect 3 dimensional meteorological data on atmospheric moisture, intensity of rain and wind velocity distribution much faster as well as in a more accurate manner than the previous radars.

https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=2ahUKEwiswPv62ZPcAhXE7GEKHa2BAQgQjRx6BAgBEAU&url=https%3A%2F%2Fwww.jica.go.jp%2Fbangladesh%2Fenglish%2Foffice%2Ftopics%2Fpress150624.html&psig=AOvVaw3lJ8zb7lBMYZkG_iuOAMYz&ust=1531283561351488

Problem Remains after Modification made by BMD in Present Warning System

Problem remains……..

- Concept of the command areas for district level warning are based on two ports and are very general.
- Wind speed and surge depth information are not local area specific
- Sometime signal numbers are confusing
- Damage information is not mentioned
- Language of warning are still difficult to understand for local people
  (people only take the 'warning number' and apply their own judgement to interpret it. e.g what is the difference between wind speed 50km/hr and 100km/hr)

  Difference between Danger Signal No, Great Danger Signal No.

Problem Remains after Modification made by BMD in Present Warning System

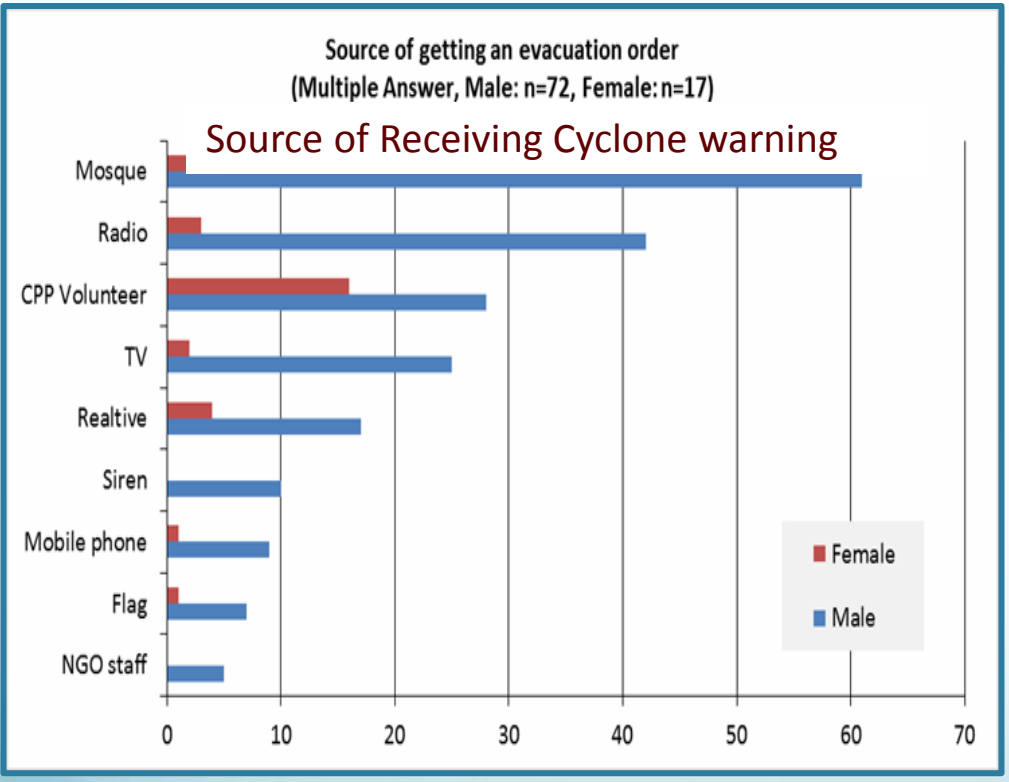
Mallick (et al. 2017) has argued that in spite of improvement in early warning systems in Bangladesh, many people still do not know how to interpret the warnings.

- He has found though 78% received a warning 6 hour before the cyclone Aila, one third of them were not able to understand the early warning message.
- Present cyclone warning system in Bangladesh is related to sea port and river port.
- Different terms that are used are confusing to the local people.
- Sometimes when the warning signal No. change there is lack of adequate information, such as, change in intensity, height of tidal surges.
- Sometimes change of cyclone warning signal no. indicates the change of cyclone track.

Part 4:
Cyclone Warning Scenario during Cyclone Aila

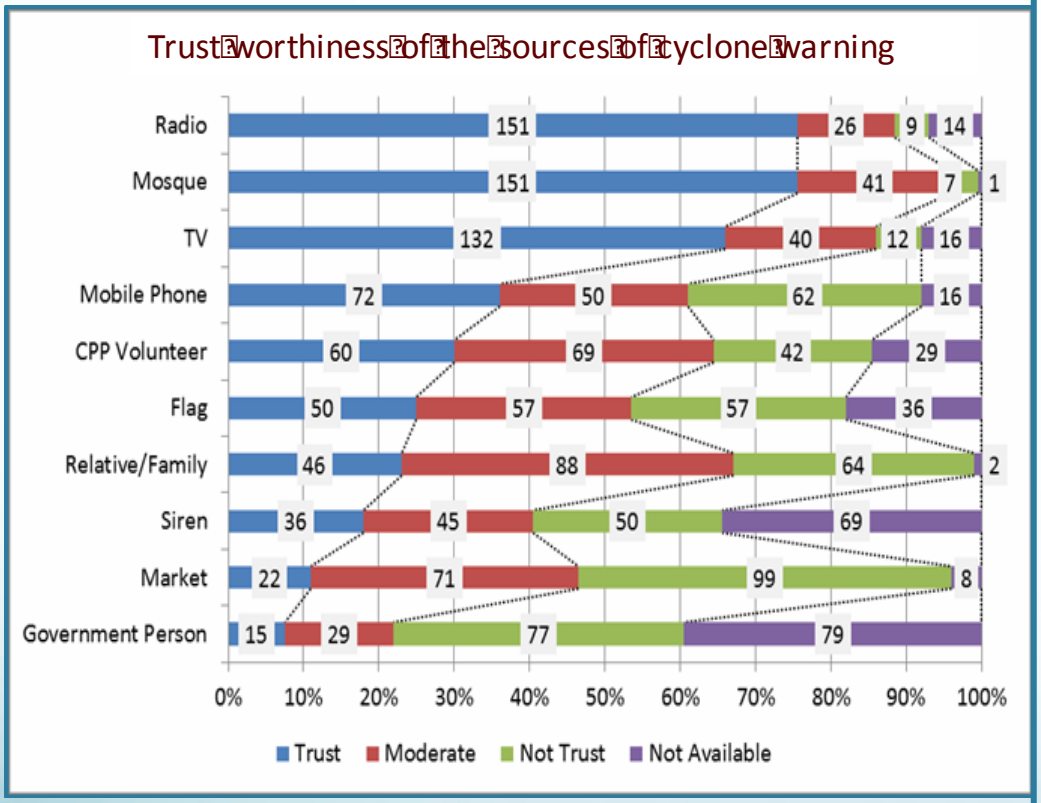
Cyclone Warning Scenarios During Cyclone Aila:

Cyclone Warning



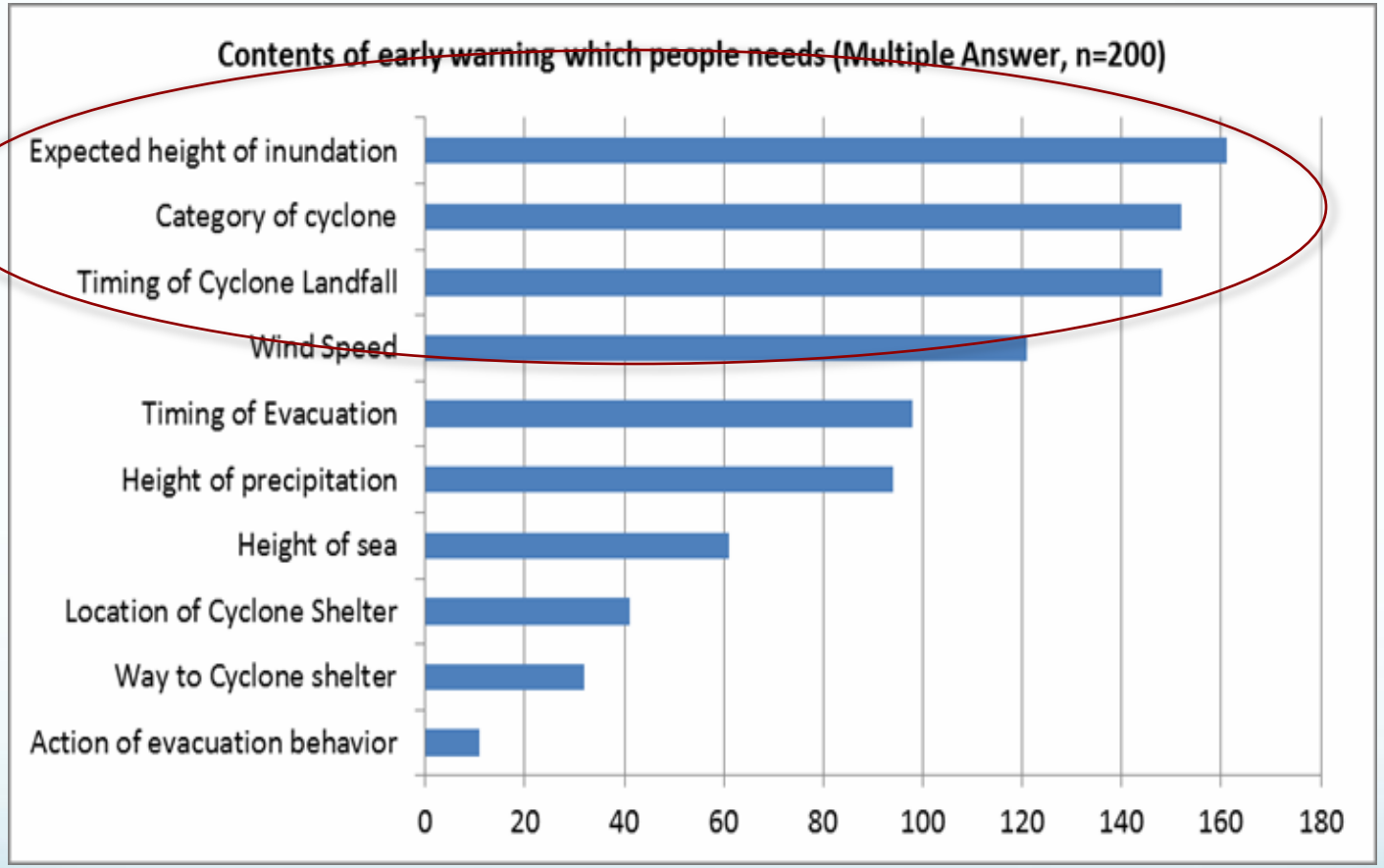
- Most of the men got warning and evacuation order from mosque.
- Mass media such as radio and TV were also relatively useful tool.
- CPP volunteer also played an important role; especially, most of women got evacuation order from CPP volunteer.
- It is claimed that during cyclone Aila CPP volunteers were late to disseminate evacuation order.
- Siren and flag, which are the main tools of warning and evacuation order dissemination were identified as not so effective.
- People claimed that the sound of siren could not be heard and flag could not be seen from their house.

Sources and Trust worthiness of Cyclone warning



- People basically trust the information broadcasted by mass media such as radio and TV.
- Mosque is one of the most trusted source.
- CPP volunteer is recognized as effective source of disseminate warning.
- However, the result shows that some people do not have high trust to the information received from CPP volunteers.
- It can be considered that cyclone warnings were disseminated many times but cyclone did not affect. Many mistakes of disseminating cyclone warning lead people not to trust CPP volunteers.

Expected Content of Cyclone warning in Bangladesh



Expected Content of Cyclone warning in Bangladesh

Main information which people need are

- locality specific expected height of storm surge and probable inundation
- Cyclone intensity or wind speed,
- time of landfall, time of evacuation
- location of cyclone shelter and safe way to cyclone shelter
- when they should start preparation for evacuation, where they should evacuate and
- how to reach there.

Concluding Remark

- Content of Cyclone Warning needs to be adjusted with the People`s Expected Information
- Language of the Warning should be easily understandable for the local and rural community
- Rather being port oriented, cyclone warning has to be districts and Upazila oriented. Local community specific information should be prioritized.
- Each Warning No. should be composed of a set of detail information, like wind speed, intensity, height of storm surge, probable damage, track
- Time of cyclone landfall
- Distance of nearest cyclone shelter, evacuation route,

Acknowledgements

This research was a part of a collaborative research project of Science and Technology Research Partnership for Sustainable Development (SATREP) between Bangladesh and the Japan Government funded by JST-JICA for whose support the authors wish to express their thanks and appreciation. Project title is `Disaster Prevention/Mitigation Measures against Floods and Storm Surges in Bangladesh` . Heartfelt thanks to Prof. Hajime Nakagawa and Prof Munsur Rahman for leading such an important project. Guidance of the Head of Component 5 Prof. Rajib Shaw and Head of Component 2 Prof. Anisul Haque are highly appreciated. Authors are thankful to the contribution of all members of Component 2 and Component 5.

Thank you very much for Your Kind Attention