

# Wind Related Disaster Risk Reduction Activities in Malaysia

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**ABSTRACT:** This paper reviews domestic activities in Wind Related Disaster Risk Reduction in Malaysia for year 2010. It describes the recent work by core agencies and organization in Malaysia to mitigate and reduce risk due to wind related disaster. In addition this paper also highlights recent damage and injuries due to wind storm.

**KEYWORDS:** mitigation, wind related disaster Malaysia, Wind Storm

## INTRODUCTION

National Security Council, is been setup under Prime Minister Office. The National Security Council responsible is:

- secretariat for the committee regarding disaster mitigation and rescue
- organized post mortem disaster
- supervise the implementation of disaster management
- organized the training for disaster management and rescue operation

## National Policies for Disaster Management

Disaster Management and Mechanism Act no 10 NSC has been published in order to provide a guideline regarding disaster management. The main objective of the Act No 10 NSC are to ensure the efficiently operation during disaster and also avoid any discrepancy between the agencies involve.

The Disaster Warning System in Malaysia are as followed:

- Flood Warning System - <http://infobanjir.water.gov.my>
- Earthquake, Tsunami & Wind Storm Warning - <http://www.met.gov.my>
- Landslide - <http://www.jkr.gov.my/v2/english/index.asp>
- Air Quality - <http://www.jas.sains.my>

## Disaster Research Nexus (DRN)

Disaster Research Nexus (DRN) School of Civil Engineering, Universiti Sains Malaysia, Penang, Malaysia DRN currently co-ordinated by Assoc, Prof Dr Taksiah A. Majid. The setting-up of the DRN was approved in the 72<sup>nd</sup> school board meeting on 11 March 2010. The DRN will co-ordinate the development of technology, human capital and awareness as well as expertise to better understand, monitor, model, mitigate and manage the risks associated with these natural/human made hazards. The Nexus pursues basic research on the prediction and mitigation of natural disasters, as well as interdisciplinary applied research oriented towards on-site applications. Natural disasters being investigated include those that are caused by earth and sea surface processes and are related to fields such as geology, geophysics, geomorphology, hydrology, oceanography, soil science, environmental technology and climate change.

The prime objectives consist of conducting fundamentally sound research of deep scientific interest, producing results which are reliable, accurate, and of practical use to both society and industry. The Nexus welcomes opportunities for collaboration with private and public institutions, locally and internationally.

### RECENT ACTIVITIES ON WIND RELATED DISASTER RISK REDUCTION

#### a) Organizing the short courses & seminars

Recently there numbers of short courses are proposed regarding wind related disaster reduction in future. For year 2010 Malaysian Structural Steel Association (MSSA) had organized 2 days Advanced Wind Engineering Design Consideration (4- 5 August). The objectives of the courses are:

1. To provide a basic design skills on wind-structure interaction
2. To provide several case studies on structural failure due to wind load
3. To provide the engineers with the advanced knowledge in designing of various types of structures subject to wind load - symmetrical and non-symmetrical structures
4. To provide the engineers with in-depth treatment of code on wind loads on structures
5. To provide engineers with the knowledge on interpretation of wind tunnels test results
6. To provide know-how to the engineers on the dynamic of wind loads affecting various type of structure
7. To create awareness to the local engineers when providing engineering services to countries experiencing abnormal wind speed than in Malaysia

#### b) Educate the Civilians

Since there are many damage occur for non engineered build during the thunderstorm. Most of non engineered buildings are located at remote area. The houses are builds by local expertise which doesn't have any technical knowledge. Therefore the initiatives to create the awareness among local expertise at remote area are taken. There is an issue where most of them cannot appreciate the previous technical brochures given

since the content cannot be understood by them. This challenge has been taken by preparing the brochure that easily can be understood. Rather than that the technical brochures provided to them is also considering the commonly building material used in remote area. This work had been initiated by Wind Engineering Research Group, Faculty Civil Engineering and Earth Resources, Universiti Malaysia Pahang (WERG).

### c) 2nd ASIAHORCs Joint Symposium

Universiti Sains Malaysia and Universiti Malaya will be organizing the Second Asian Heads of Research Councils (ASIANHORCs) Joint Symposium and 4th ASIANHORCs Meeting at Kuala Lumpur from 1-3 November 2010. For this year, the DRN has been functioning as secretariat for this program. The theme of this symposium is “Natural Disaster Management: Lessons Leant & Shared Best Practices”. Senior and young researchers from ten member countries of ASIAHORCs will attend this symposium. The joint symposium is open to all academicians, researchers, scientists, engineers and students from this region to participate. Asian Heads of Research Councils Conference (ASIAHORCs) meetings are held as a one of core component of program Japan Society for the Promotion of Science (JSPS). The symposium works to strengthen the network among Asian countries by presenting and discussing issues of common interests. Several papers regarding wind hazard will be present for coming symposium.

### RESEARCH ON REGARDING WIND RELATED DISASTER RISK REDUCTION

The possibility risk of wind load damage to roof structure. Conventionally in Malaysia most of the roof design only considered wind load acting as a pressure load to the roof structure. However from the many research done it seem that wind also can cause suction load to the building structure. Most damage to roofs themselves is caused by local high suctions and large pressure fluctuations around the roof periphery and protruding portions. In Malaysia the most of truss system used as roof structure is steel and wood. Steel truss structure is commonly used almost at urban area and considered as engineered building while wood frame truss always used at rural area which is almost are non-engineered building. Recently both of the structure system fails during the thunderstorm. Figure 1 a-e shows recent damage due to thunderstorm event. Currently study is conduct to examine whether the conventional method of design and current approach of construction in Malaysia is secure during the high wind speed.



Figure 1a – Steel Truss failure



Figure 1b – Steel Truss failure



Figure 1c – Roof Sheet Failure



Figure 1d – Roof Damage

### Remote Sensing Approach in Wind Engineering

Remote Sensing systems are used to observe the earth's surface from different levels of platforms, such as satellites and aircraft, and make it possible to collect and analyze information about resources and environment across large areas. Remote sensors record electromagnetic energy reflected or emitted from the surface. This characteristic makes it possible to measure, map, and monitor these objects and features using satellite or aircraft-borne remote sensing systems. Satellite imagery offers a number of advantages over conventional techniques of collecting data. Therefore this technique can be used to collect data for spatially distribution. Figure 2a-b shown the example of remote sensing technique in monitor intensity of rainfall.

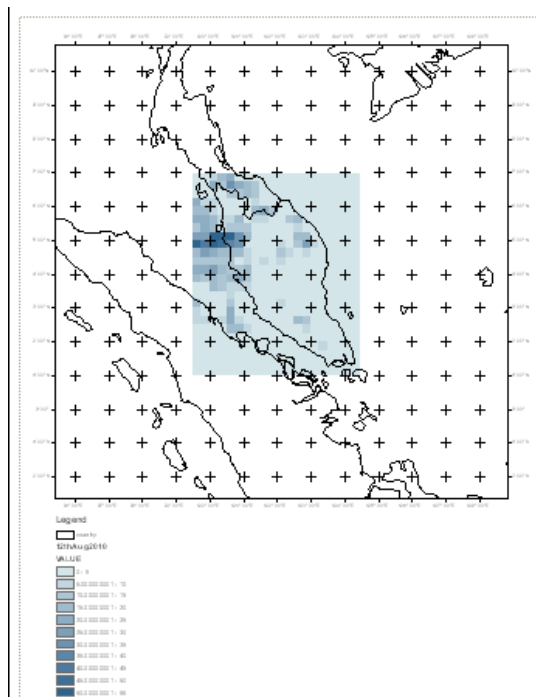


Figure 2a

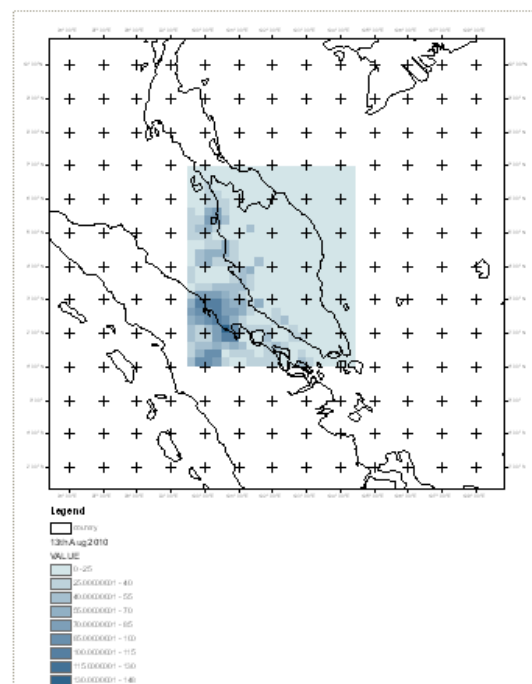


Figure 2b

## RECENT DAMAGE DUE WIND STORM IN MALAYSIA

Most of possibility risk of wind hazard base on recent wind-induced damage to buildings and structures in Malaysia is due to thunderstorm. There are very little emphasizes of design building structure such as roof and cladding to minimize wind-induced damage to buildings. Several study had made by previous researchers in Malaysia. From the study made there are several factors are founded to contribute damage to building component. It can be conclude most of the failures cause by lack of the consideration due to wind effect during design stage.

Table 1 shows the recent damage due to windstorm in year 2010(Jan – Aug). It can be shown that most of the damage occurs in northern region on peninsular Malaysia. Furthermore it clearly stated most structure failure is roof and truss. The numbers of flying canopy due to wind are also become dangerous hazardous. The consequence of flying debris also now had been noted as most dangerous hazardous. Figure 3b-3d shows damage occurs at Malacca Night Market due to thunderstorm. In 13 august at Malacca the flying object from canopies had hit and kills 3 patrons of night markets.

Table 1: Damage due to Wind Storm in Malaysia (January – August 2010)

	Place	Region	Numbers of Affected	Structure Damage
27-Jan-2010	Sungai Petani, Kedah	Roof and truss	350 Houses	Roof and Truss
5-Apr-2010	Bukit Mertajam, Penang	Northern Peninsular	21 Houses	Roof and truss
5-Apr-2010	Mergong, Kedah	Northern Peninsular	13 Houses	Roof and truss
12-Apr2010	Baling, kedah	Northern Peninsular	200 Houses	Roof and truss
13-Apr-2010	Merbuk, Kedah	Northern Peninsular	150 Houses	Roof and truss
22-Apr-2010	Sg besi - Kg Malaysia	Middle Peninsular	18 Houses	Roof and truss
1-May-2010	Ulu Bernam, Selangor	Middle Peninsular	Secondary School	Roof and truss
31-May-2010	Parit buntar-Perak	Northern Peninsular	*	Roof and truss
11-Jun-2010	Batu Gajah-Perak	Northern Peninsular	30 houses	Roof and truss
13-Jun-2010	Temerloh, Pahang	Eastern Peninsular	9 houses and School	Roof and truss
7-July-2010	Beaufort, sabah	Eastern Borneo	50 houses	Porch, Roof
15-July-2010	Kuala Perlis, Perlis	Northern Peninsular	150 houses	Roof and truss
12-Aug-2010	Temerloh, Phang	Eastern Peninsular	20 houses Canopy Damage	Roof Night Market
13-Aug-2010	Malacca	Southern Peninsular	Canopy Damage 3 Kills 30 injured	Night Market (Flying Debris)
14-Aug-2010	Jerlun, Kedah	Northern Peninsular	1 Houses, Crop	Roof
14-Aug-2010	Petaling Jaya, Selangor	Middle Peninsular	*	Roof and truss
31-Aug-2010	Tanjung Malim	Middle Peninsular	Canopies Damage	Night Market

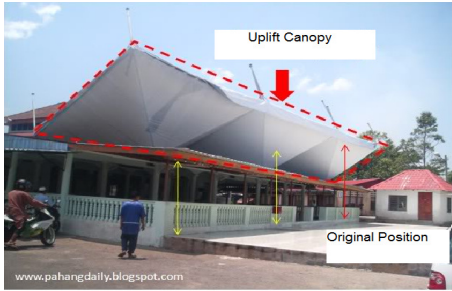


Figure 3a: Uplift canopy



Figure 3b: After Thunderstorm



Figure 3c: Injuries peoples



Figure 3d: Canopy Collapse

There are also many instances of partial lift off clay tiles fixed at eaves of roof and at ridge corner. From the investigation made damage to the tile roofs increase with the simplification of the substandard, i.e. decreasing the weight of roof tile, insufficient of nail fixed to the roof tile and the less of lay between the roof tiles.



Figure 4a: Uplift Roof Tile



Figure 4b: Damage Roof Tile



Figure 4c: Damage Due Flying Debris



Figure 4d: Flying Debris of Roof Tile

## CONCLUSION

This paper briefly describes a number of activities recently in Wind Related Disaster Risk Reduction. The collaborations framework between several agencies are now been discuss to mitigate Wind Disaster.

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