

# 4MCDRR-2010: Report of Vietnam

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**ABSTRACT:** This paper is submitted as country report of Vietnam which describes the wind damages during the period of 1990~2010, wind hazard mitigation system established by government.

**KEYWORDS:** Wind hazard mitigation, Wind damages, Vietnam.

## 1 STATISTICAL DATA OF WIND DAMAGES DURING 1990~2010

Statistical data of the wind-related disaster is obtained from official website of the Central Committee for Flood and Storm Control (CCFSC), <http://www.ccfsc.org.vn> and detail is given in the Table 1. In this table, damages of natural disasters during period of 1989-2009 and strong winds are presented for comparison. It is noted that, data of the year of 2004 is not included.

Evidence given in Table 1 makes clear that, strong winds made huge losses to the society. Statistics showed that, annually, there are more than 200 people were death and over 500 people were bad injured, more than 25,000 houses were destroyed and over 230,000 were in bad damaged after strong winds events.

In Vietnam, typhoon is always a subject at highest level of consideration by Government. However, looking into fatality due to tornado-likes annually, it can conclude that, tornado-likes contribute a considerable amount of losses in comparison with typhoons. Authors would like to emphasize the importance of the tornado-like related disaster in Vietnam as they occur more frequency than typhoon and to date have no report on the tornado-like intensity. The post-disaster investigation is necessary for risk management. The classification of strong winds and their prone-zone can be found in [www.thoitietnguyhiem.net/](http://www.thoitietnguyhiem.net/) and Giang et al. (2009).

## 2 WIND HAZARD MITIGATION ACTIVITIES IN VIETNAM

This session describes on the Government's system for wind hazard mitigation and recommendations for strengthening houses during typhoons and other strong winds.

### 2.1 *Wind hazard mitigation system in Vietnam*

### 2.2 *Recommendations for strengthening non-engineering houses*

### 2.3 *Comments given by authors*

Table 1 Damages due to all natural disaster and wind related damages during period of 1989-2009 (data of the year of 2004 is not included)

List	Damage to	Classification	UNIT	All natural disaster	Due to strong winds	Due to Typhoon	Due to Tornado-like
1	Humanitarian	People killed	No.	9,679	4,060	3,144	916
		People injured	No.	14,241	10,916	7,782	3,134
2	Housing	Collapsed	1000	738	526	499	27
		Submerged and bad damaged	1000	11,364	4,668	4,443	225
3	School/ Education	Classrooms collapsed/washed away	1000 Room	37	23	21	2
		Classrooms damaged	1000 Room	162	100	95	5
4	Hospital (Clinic)	Collapsed/	No.	3,105	2,909	2,834	75
		Submerged and damaged	No.	28,258	24,414	23,975	439
5	Agriculture	Paddy inundated	1000 Ha	6,605	3,992	3,765	226
		Forest damaged	1000 Ha	164	157	155	2
		Trees collapse	1000	48,489	42,644	42,330	313
		Cattle killed	1000	126	69	68	1
		Pigs killed	1000	1,035	265	261	4
		Poultry killed	1000	9,584	2,847	2,794	53
6	Water Resources	Earth eroded, washed away	1000m3	181,134	42,708	42,520	188
		Rock eroded, washed away	1000m3	1,641	1,231	1,230.60	0.4
		Dykes eroded, washed away	1000m	3,243	1,252	1,251	780
		Revetment blew off	1000 m	246	153	152.6	0.4
		Canals blew off	1000 m	8,573	1,392	1,080	312
		Culverts under dykes collapsed, drifted	No.	6,049	3,243	1,440	1,803
		Small hydraulic structures collapsed	No.	5,698	1,950	1,921	29
		Small hydraulic structures damaged	No.	13,709	6,381	5,381	1,000
		Sluice gates drifted	No.	8,989	3,149	2,830	319
Pumping stations submerged	No.	1,456	622	504	118		
7	Transportation	Earth eroded, washed away	1000m3	63,317	31,218	29,460	1,758
		Rock eroded, washed away	1000m3	862	352	350	2
		Bridge, sewer collapsed	1000	13.7	6.3	6.157	0.148
		Bridge, sewer damaged	1000	49.5	8.15	7.6	0.55
		Roads damaged	1000 Km	7,297	76.997	76.771	0.227
		Surface of the road damaged	1000m2	6,338	3,006	3,006	0
8	Aquatic product	Fish and shrimp feeding area destroyed	1000 Ha	462.5	274.1	270.1	0.4
		Shrimp, fish lost	1000 ton	92.2	72.89	72.56	0.32
		Ships and boats sunk, lost	No.	16,727	12,081	11,295	786
		Ships and boats sunk, damaged	No.	13,092	10,483	10,252	231
9	Communication facilities	Telephone poles collapsed	No.	52,028	39,859	38,509	1,350
		Telephone wire broken	1000m	6,383	4,497	4,483	14
		Telephone switchboards damaged	No.	1,308	1,284	1,121	163
10	Energy facilities	High voltage electric towers broken	No.	13,706	10,947	10,767	180
		Electric distribution poles broken	No.	66,128	56,779	53,001	3,778
		Electric wire broken	1000m	5,957	4,613	4,454	159
		Transformer stations damaged	No.	783	580	573	7
		Transformer damaged	No.	81	31	23	8

### 3 DAMAGES OF HOUSES DUE TO STRONG WINDS AND QUESTIONS OF BUILDING DESIGN IN PRACTICE

3.1 *Damages to the agricultural facilities*

3.2 *Damages to the communication facilities*

3.3 *Damages to the hospitals/clinics*

3.4 *Damages to the energy facilities*

3.5 *Damages to the houses and others*

3.6 *Comments by authors*

### 4 CONCLUSIONS

The paper outlined the picture of wind related disaster in Vietnam. Government system for wind damage mitigation is introduced. Comments by authors are given for discussion.

### REFERENCES

- Le Truong Giang et al., 2009, Extreme wind climate and a proposal to improve the basic wind map for structural design purpose in Vietnam, APCWE-VII Proceeding, pp.809~812;
- Vu Thanh Trung 2010, Report on structural performance of steel profiled sheet by uniform static air pressure difference, 2010.