

Wind-Related Disaster Risk Reduction Activities in Republic of Korea

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1 INTRODUCTION

Recent typhoon KOMPASU landing on Korean Peninsula on the early morning of Sep. 2nd this year claimed four lives and three wounded in addition to numerous damages on structures and orchard. More than millions of people suffered from outage due to damages on power lines, which is also responsible for huge loss of fish farm. This was the first severe typhoon ever landing on Korea since typhoon MAEMI in 2003 and very different one from the precedents. KOMPASU was classified as Category I at landfall; however, strong wind fortified with the advance speed of 50km/h caused severe scars on the land, in particular, while it passed through the middle of the peninsula, the most populated and developed region. Most damages were done on components and cladding of the buildings, trees and light steel structures, all of which can then be turned into wind-borne debris. In fact, three out of four casualties were claimed by flying debris of trucks or steel. This recent tragedy offers us everlasting lessons that no matter how strict or well-prepared the wind code is, there always exists risk of wind-related disasters both in lives and assets.

Korea's efforts to reduce the wind-related disasters range from renew of wind code through five years' of collaborated studies to establishment of methodology for wind risk assessment. The activities to mitigate the wind-related damages have been led by a variety of organizations including WEIK, construction companies as well as central and local governments.

2 DOMESTIC ACTIVITIES IN WIND-RELATED DISASTER RISK REDUCTION

2.1 *Renew of Codification*

Wind code for buildings and other structures has been renewed in 2009 after 5 years' of study funded by the Ministry of Land, Transport and Maritime Affairs. Climate change and its effects on the extreme wind have been studied in order to update the wind code, and zonal classification for basic wind speed is slightly modified from the code of 2005; however, it is still based on the 10 minute averaged value and the special attention on the coastal area of typhoon prone region has not been paid [1]. Similar to Japan, a separated wind code for bridges is established; however, the basic wind speed and its zonal classification are not consistent with those for the building wind code [2]. Speculating the recent wind damages from KOMPASU, the next wind code needs to consider the wind-borne debris

2.2 *Legal Activities for Mitigation*

Natural Disaster Prevention Act of Korea specifies 10 types of structures that need regulations and codes for wind-resistant design, which are buildings, airport, park, road and bridges, cables, crane and lift, bulletin boards, power lines, ports, railways.

The act also specifies two kinds of legal operations for local governments. The first one is establishing mitigation plan for natural disasters including wind-related one for all of 234 local governments of Korea. The plan should include survey and evaluation of natural disaster in the region, and summarize the risk with corresponding mitigation measures. Each local government is required to renew the plan every five year. Since 2007, more than 100 local governments have established the plans, some of which are still under review by central government. The second one is assessing the risk of natural disaster of planned development whenever there is change in land cover or topography.

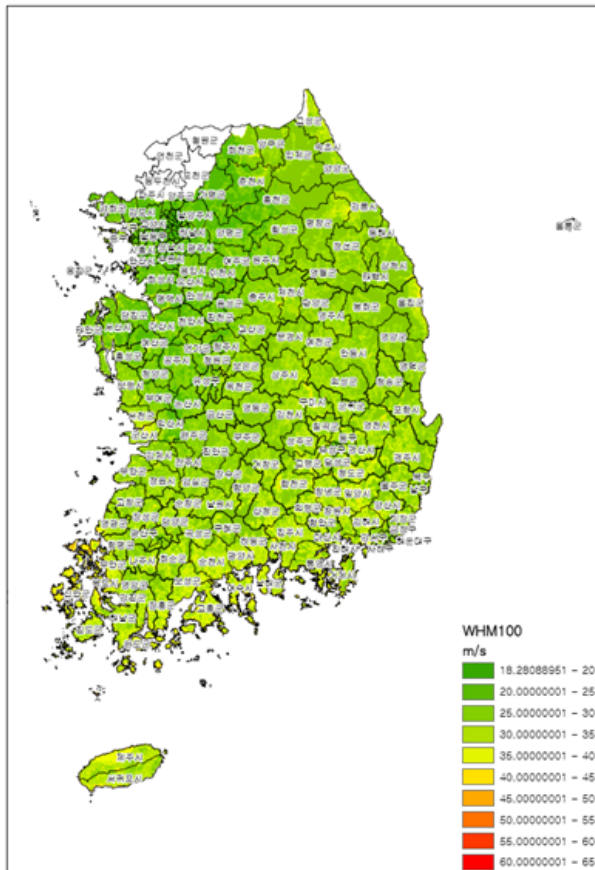


Figure 1. Wind Hazard Map

2.3 Insurance

Natural Disaster Insurance Act of Korea has taken effect since 2004, and National Emergency Management Agency (NEMA) and three major insurance companies are involved with the insurance. Starting with greenhouse, cattle shed and small houses, commercial buildings are recently included as insured properties. By the act, the policyholder pays about half of the premium while the other half is paid by NEMA. Since it is effective in 2006, a lot of policyholders have benefited from the insurance. One of the critical issues regarding the insurance act has been determination of insurance rate for the insured properties whose risks are never identical. Since very few claim

data have been accumulated and the natural disasters are caused by unforeseen meteorological phenomena, statistical method has been developed [3] and produced wind hazard map as shown in Fig. 1.

2.4 Wind-Risk Assessment

Initiated from lack of wind-risk assessment methodology in both local government and insurance company, development of wind risk assessment method has been carried by a collaborated research of universities and IT company funded by NEMA. Since risk consists of hazard and vulnerability, extreme wind speed analysis and typhoon Monte Carlo simulation are carried out for the Korean Peninsula while vulnerability has been studied by both statistical and experimental approach [4] as shown in Fig. 2. The developed method was implemented into web-GIS code (Fig. 3).

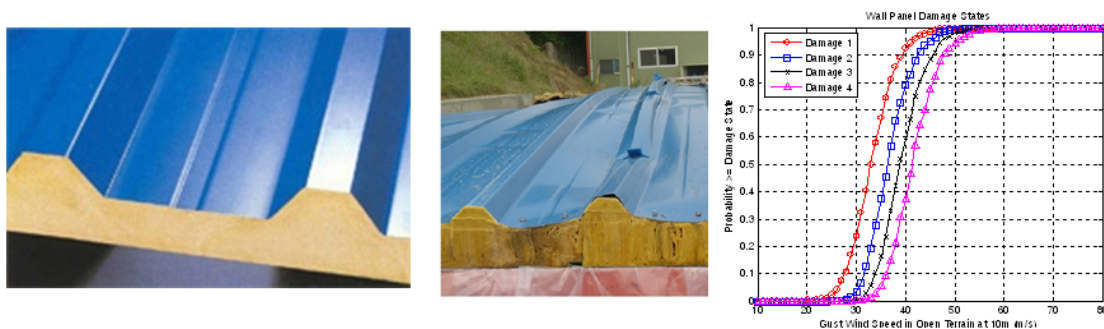


Figure 2. Experimental study for vulnerability [4]

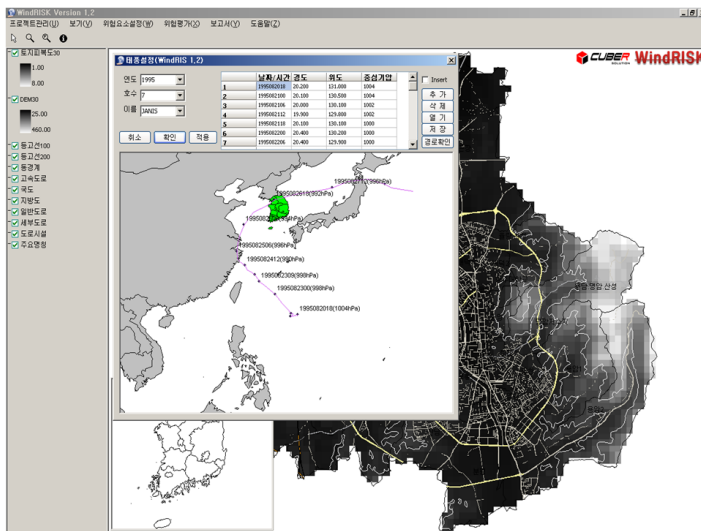


Figure 3. GIS-based wind risk assessment

2.5 Climate Change and Wind Risk

As IPCC AR4 (2005) indicated, the typhoons in the east Asia will be fortified by the increased sea surface temperature and the genesis seems move north. In this perspective, NEMA recently orga-

nized a collaborated research for the effects of climate change on the resistant capabilities of structures. It covers rainfall, strong wind, snowstorm and sea level rise. The study started in 2008 and will be going until 2011. In order to estimate the extreme wind in the future, downscaling of various GCMs and prediction of extreme wind has been carried out [5]. In addition, the intensity of typhoon is postulated to be dependent on SST and the relevant model has been developed [6].

3 INTERNATIONAL ACTIVITIES IN WIND-RELATED DISASTER RISK REDUCTION ACTIVITIES

With common interests in sharing information of typhoon and its disaster, typhoon committee initiated to establish TCDIS (typhoon committee disaster information system) during 2007~2009 which appeared in homepage (www.tcdi.org) supplying some information of disaster related to typhoon and tropical cyclones without any estimation of loss [7]. As the chairman country of disaster prevention subcommittee, NIDP (National Institute of Disaster Prevention, Korea) implement an estimation system with web-based GIS for Korean provinces, building historical database on climate and disaster report with some statistical models. Figure 4 shows TCDIS.

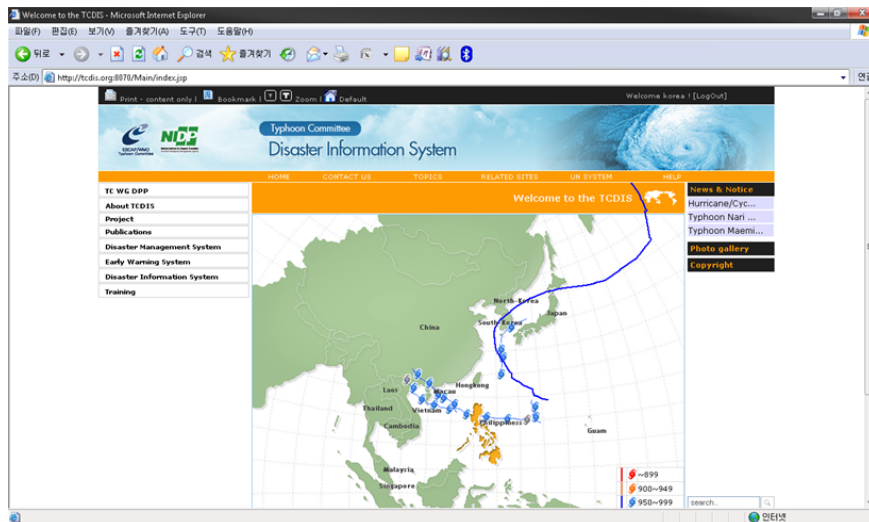


Figure 4. TCDIS

4 CONCLUDING REMARKS

Recent wind damage by typhoon KONPASU reminds us the risk of wind-related disaster and urges us to endeavor more efforts to mitigate the damage and risk. Korea has been carrying out a variety of activities both domestically and internationally to reduce the risk and to improve the mitigation capability and measure. Renew of codification as well as future typhoon simulation with studies of climate change can enhance the capabilities of wind-related disaster risk reduction, and hopefully help societies and countries who face the similar risk. Insurance prompted by government has helped people in loss and alert others in preparation.

A lot has been done for WRDRR; however, mitigation of natural disaster is a very long journey for all of us.

5 ACKNOWLEDGMENTS

This work was supported by the grant from Natural Hazard Mitigation Research Group funded by National Emergency Management Agency, South Korea

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