

### **Need of Studying Disaster Management in Hong Kong**

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### **Introduction**

The world today is exposed to new and various kinds of dangers due to complex changes in climates and social structures [e.g. 1]. We are now facing unpredictable threats which have the potential to spread globally: large-scale natural disasters that were uncommon in the past, together with terrorism that threatens many nations and new viruses. In recent years, we have witnessed some of the worst calamities, such as the 9.11 terrorist attack of the US World Trade Center in 2001, huge typhoon disasters in Korea in 2002 and 2003, the tsunami that swept across Southeast Asia in 2004, Hurricane Katrina that wreaked havoc in the United States in 2005, the new type of influenza in 2009 and Hurricane Sandy hitting the US east coast in late October 2012. Urbanization is taking place amid the rapid economic growth, resulting in the formation of many big cities in places such as: the Pearl River Delta, the Yangtze River Delta and the Beijing Capital Circles in China; Tokyo Great Circles and Kansai Areas in Japan; Seoul Areas in Korea and many others all over the world. In these dense urban areas, the emission of greenhouse gases is high due to the extensive use of energy for buildings and vehicles; green features are now incorporated in the building designs to lower the emission and create a sustainable environment. However, there are potential fire hazards [2] in these green or sustainable designs. Taking building application as an example, many green architectural features have difficulties in complying with the fire safety regulations. Double-skin façades and natural ventilated buildings with large spaces are very obvious examples. Other examples include buildings over 400 m tall, long tunnels for railway and vehicles, large shopping malls, deep underground subway stations and public transport interchanges. Buildings are well-sealed for energy conservation; big malls have deep plan and framed structures with glass façades for low-cost, quick construction. A big fire or explosion [3] would lead to disaster, endangering human lives, damaging properties and disturbing normal operation of business. In addition, the number of fires all over the world appears to be on the rise since 1996, after the big accidental fire of Garley Building in 1996. There have been several cases of arson and explosions in subway stations in Korea, Hong Kong and Russia.

Global climate changes due to whatever reasons such as carbon emission might bring very heavy wind and rainstorms, hence flooding and landslides. The frequency of large-scale earthquakes and tsunami seems to increase. The Union Carbide disaster in Bhopal, India showed that release of toxic clouds [4] is hazardous. In 2010, the air traffic was suspended in Europe after the 2010 Eyjafjallajökull eruption [5]. However, little systematic research on this area has been conducted. Major emergency plans, if available, might only cover common hazards. The key element of public health is not included in the emergency management for toxic cloud release [6]. Strategies to quell with disasters, be it natural or man-made, must be worked out for dense urban areas. Some governments have already designated or established departments and agencies to be responsible for the policy-making and research on global disaster management, for examples, the Federal Emergency Management Agency in USA and the National Emergency Management Agency in Korea. It is not clear whether the Security Bureau in Hong Kong has developed any disaster management plan. Citizens have not been informed of any emergency plans, nor have they received training to ensure public safety in case of calamities. Even flooding led to heavy traffic jams a few years ago.

### **Research Support**

We will encounter unprecedented challenges in the future due to climate changes, environmental pollution, yellow dust and the potential spread of epidemic. Future disaster management requires the establishment of a disaster prevention community that mutually cooperates and aims at minimizing damages. Research, technology, and policies of forecasting and responding to future disasters must be enhanced. As pointed out in the literature [1], we should focus on developing disaster management knowledge and accumulating experience in investigating threatening elements and their spread factors; real-time forecast, warning, response system should be enhanced; environment-friendly damage recovery and territorial foundation reinforcement should be implemented. Public safety can only be achieved through technological innovation, academic creativity and the creation of new markets.

Therefore, it is necessary to better understand the impact of the following disasters, so the findings can be applied to devise appropriate disaster management schemes for different kinds of disasters.

- Big fires and explosions, including the ones prompted by accidents, arson p and terrorist attack, in tall buildings, long tunnels, deep underground subway stations and new constructions with green features.

- The effects of strong winds and heavy rainstorms on building safety.
- Landslides.
- Earthquakes and tsunami.
- Release of toxic or particulate clouds.

Although much research has been carried out in each area, very few studies focused on working out disaster management schemes that guarantee public safety. For different kinds of disasters, the disaster management plans are very different. For example, only elevators can be used in the emergency evacuation in the second tallest building in the world, Taipei 101, except in fires. A viable, comprehensive disaster management plan must be worked out to ensure public safety. New breakthrough can only be achieved by carrying out in-depth research in these areas.

The following should be carried out in Hong Kong:

- To carry out research related to hazards of fire and explosions, wind, rainstorms, landslides, earthquakes and tsunami, release of toxic and particulate clouds; the research should be up to international level.
- To explore appropriate protection hardware provisions for public safety.
- To explore prediction methods with advanced information technology, such as remote sensing.
- To work out appropriate disaster management schemes, particularly in action taken by first respondents to disasters.

Results will be used to raise the awareness of citizens in Hong Kong. The government will be advised to work out appropriate disaster management schemes for a sustainable, dense urban environment.

### **Challenges ahead**

Interdisciplinary efforts are needed in comprehensive research on disaster management. Individual disasters and resulted crowd movement cover many circumstances [7]. Disaster research appears to have two approaches. The first one is ‘top-down approach’, which relies on national or regional statistical surveys. This approach is good for understanding the scale of the problem. The other is the ‘bottom-up approach’, referring to in-depth experimental or field case studies. Such approach, the modeling works of hazard assessment in particular, is useful in understanding why the disaster occurs. However, very few efforts have been made to combine the two approaches [7]. Building use and the associated safety research

had been discussed [7]. Terms like ‘safety’, ‘risk’, ‘accident’ and ‘disaster’ were discussed and proposed to take ‘disaster’ as a dramatic incident which involve many people and/or natural hazard damages.

The physics of fire, wind, rainstorms, landslides, earthquakes and tsunami should be studied carefully. Advanced theory on heat and mass transfer, fluid mechanics, solid mechanics, wave theory, hydraulics and combustion will be applied to understand the consequences of hazard scenarios. Hardware safety provisions can then be proposed and evaluated based on these findings; appropriate disaster management scheme can then be worked out. Reliability and risk analysis techniques are used; associated research activities on disaster management should be carried out as a collective research theme, rather than as normal research proposals on a single specific topic.

### **Needs of Hong Kong**

There is not an independent government agency to handle disaster management in Hong Kong now. Out of all the aforementioned disasters, fire might be the area where the government has paid more attention to. The Fire Services Department is the key body in firefighting and rescuing. Some firemen had been killed in several big post-flashover fires, and these incidents demonstrate the necessity of improving the fire safety management, firefighting techniques [8], protection provisions and training. These cannot be achieved without in-depth research on fire safety. Big fires cause losses of life, damage properties and disrupt normal operation of business, some of the recent cases included the grounding of flights in Europe in 2010 [3]. Gases emitted in big fires and explosions would pollute the atmosphere. Research on the above areas would definitely be able to make an impact on the creation, application and exchange of knowledge related to public safety and disaster management in Hong Kong.

### **References**

1. Y.S. Park, “Opening Remark”, 1st International Conference on Policy & Research for Global Disaster Management, November 11-13, 2009, Seoul, Korea (2009).
2. W.K. Chow and C.L. Chow, “Green influences”, Fire Prevention & Fire Engineers Journal, September, pp. 34-35 (2003).
3. W.K. Chow, “Fire engineering research and education in Hong Kong”, 3rd International Symposium on The 21st Century Center of Excellence Program: Tokyo University of Science, 10-11 March 2008, Tokyo, Japan (2008).

4. V.R. Dhara, R. Dhara, “The Union Carbide disaster in Bhopal: a review of health effects”, Archives of Environmental Health, Vol. 57, pp. 391-404 (2002).
5. BBC News - “Icelandic volcanic ash alert grounds UK flights”, 15 April 2010.  
<http://news.bbc.co.uk/2/hi/8621407.stm>
6. M.T. O’Mahony, D. Doolan, A. O’Sullivan and M. Hession, “Emergency planning and the control of major accident hazards (COMAH/Seveso II) Directive: An approach to determine the public safety zone for toxic cloud releases”, Journal of Hazardous Materials, Vol. 154, pp. 353-365 (2008).
7. J.D. Sime, “Accidents and disasters: vulnerability in the built environment”, Safety Science, Vol. 14, pp. 109-124 (1991).
8. W.K. Chow, “Water suppression systems for tall atria”, Paper presented at PR4GDM 2009, 1st International Conference on Policy & Research for Global Disaster Management, November 11-13, 2009, Seoul, Korea (2009).

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