

## **Chin-Hsiung Loh**

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**Chin-Hsiung Loh** is a professor in the Department of Civil Engineering at the National Taiwan University. He is also a distinguished professor at the National Taiwan University. He received his Ph.D. degree in Civil Engineering from the National Taiwan University. He had been Research Associates at UC Berkeley and University of Illinois at Urbana. He had also been a visiting scholar at Stanford University and California Institute of Technology, respectively, and a visiting professor at the University of Michigan. He was the Director of National Center for Research on Earthquake Engineering, Taiwan, during 1997-2003, and the Director of National Center for Disaster Reduction in 2003. He also served as a program director of earthquake hazard mitigation program of NSC during 2005-2008. Dr. Loh research interests include structural system identification and damage detection, structural health monitoring, structural control and earthquake hazard mitigation. Dr. Loh received NSC outstanding research award from 1993 to 1997, and NSC special research award from 1997 to 2003. Dr. Loh was recently awarded the distinguished professor from National Taiwan University in 2006.



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### **Technologies Required for the Mitigation and Management of Mega-Disasters**

Reducing vulnerability to natural hazards is a critical concern for natural hazard prone area. However, hazards vary by location, and society has scarce resources to devote to mitigation. Decision makers need methods for integrating realistic predictions of disaster effects with information about community assets and the costs of possible mitigation options so that these options can be effectively prioritized. For example, information on the likely locations and extent of potential ground failures from a specific earthquake source is required for prioritizing earthquake mitigation efforts before an earthquake occurs. Hazard management framework contains three major issues: Hazard risk assessment (science & engineering knowledge), emergency management (planning and mitigation tool), and emergency services (lifelines and social services). To provide community resilience to natural physical hazards research agencies, government, and community must collaborate and communicate to each other under this hazard management framework. Development of knowledge-based emergency and risk management support system can provide excellent support system for hazard management. Missions of emergency management in national level covers: a) promote sustainable management of hazards, b) enable communities to achieve acceptable levels of risk, c) require local authorities to coordinate EM planning and activities through regional Groups, d) provide for integration of national and local emergency management planning, e) encourage coordination across agencies, f) Defines roles and responsibilities of national agencies and international assistance. Effective emergency hazard management included emergency preparedness, response, and recovery result from the coordinated and collaborative efforts of multiple organizations, both governmental and commercial. These organizations must not only coordinate their preparations for and initial response to all types of emergencies, but must remain coordinated and collaborative in highly dynamic and volatile situations.

One of the important elements for reducing the MC/MD hazard is to develop a close

relationship among local government, emergency services, welfare sector, community and lifelines. The local government needs to provide commitment to work together, to develop and coordinate planning and activities, and do the work on readiness, response and recovery. The emergency services need to plan and exercise jointly with emergency management group members and carry out emergency management group plan functions. The welfare sector and community need to plan and exercise jointly, and service meet emergency. Due to the change of infrastructure and the environmental situation, enhancement of both typhoon and earthquake disaster emergency response capabilities must be conducted, such as to assemble hazard warning information from all related agencies and to provide all the assessment information sources and coordination among all related agencies (government and private) to assemble hazard information for hazard management.

Finally, to develop MC/MD hazard mitigation the following future works need to be strengthened

#### ***A. Enhancement database and decision-support system***

Many databases for disaster reduction have been built by government units, but most of them are scattered in different agencies, and difficult to integrate. Therefore, they can only provide limited information for decision-support systems. To establish information system for disaster decision-support system, special attention will be given to the following points:

- Standardizing classification, format, quality of data and procedure for data updating,
- Adopting an open type of GIS technology to integrate the spatial geographical information scattered in different units and NGOs,
- Establishing a common platform for the disaster reduction database,

#### ***B. Application of remote sensing technology***

Remote sensing technology can provide effectively observed information for different types of disaster. They can be used to monitor field situation of disaster and thereby to assess losses in a large area. The effort to promote application of remote sensing will be concentrated on the following:

- Upgrading capability for disaster monitoring and investigation by well-developed high technology, such as airborne radar,

- Establishing a multi-functional telemetric data integration center for integration of data from different time and sources,
- Developing and implementing a comprehensive land use monitoring program,

### ***C. Establish Sustainable land use management***

In recent years, the risk of large-area landslide, debris flow and flood disasters have drastically increased. The fundamental way to reduce the risk of these disasters is to avoid improper land exploitation. The development of technology for land use management will be focused on the following:

- Establishing a disaster risk assessment system for land use planning,
- Intensifying research on land use development and ecological engineering related to disaster reduction,
- Integrating effectively the land use management mechanism with the disaster reduction operations system,

### ***D. Establish inter-ministerial collaboration mechanism***

Because the subject areas for research and development in disaster reduction technology are of highly interdisciplinary and inter-ministerial nature, it is learned that consolidated planning, coordination and management are critically important. Methodology and system development for mega-city and mega-disaster hazard mitigation need an integration of a lot of assessment tools and policies.