研　究　速　報

Regional Network Office for International Cooperation in Research for Urban Safety

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1. Introduction

With the rapid economic development in the last few decades, there has been a phenomenal growth of high-rise buildings and other infrastructure in mega cities in Asia. However, this growth in infrastructure is not adequately balanced in appropriate measures for their maintenance and management. This has led to deterioration of urban infrastructures and resulted in urban disasters in many cities. Recently, the issue maintenance of urban buildings and infrastructure in Japan has been sensationalized by Mass Media after several incidents of blocks falling from concrete structures, such as bridges and tunnels in different parts of Japan (Larimer, T., 2000). The frequency of floods in Asia has doubled in the last 30 years. The rate of increase of urban flood frequency is more prominent in the last 10 years, especially, the statistics of the recent three years show rapid increase of floods in Asian cities (Dutta, 2003). Kobe Earthquake disaster of 1995 showed clearly the vulnerability of our cities against earthquake disasters.

The recent developments of various advanced technologies including remote sensing, GIS and other computational tools have generated scope and motivation to focus on devising appropriate methodologies for management and maintenance of urban buildings and infrastructures for sustainable development of the Asian mega cities with adequate safety and security.

The International Center for Urban Safety Engineering (ICUS), a research center located at the Institute of Industrial Science of the University of Tokyo, Japan, focuses on research and developments in the field of urban safety engineering including maintenance and management of infrastructures with new technologies from a global perspective. ICUS emphasizes on collaboration in research with international organizations particularly in Asian region. To strengthen its collaborative research efforts, there have been several activities undertaken by ICUS (Dutta and Uomoto, 2002; Misra and Kato, 2003). One of the most significant steps for expanding its collaborative activities is the establishment of a Regional Network Office for Urban Safety (RNUS) in Thailand. RNUS was established on October 29, 2002 at the School of Civil Engineering (SCE) of the Asian Institute of Technology (AIT) to work in areas of mutual interest of SCE and ICUS for the advancement of urban safety engineering utilizing advanced engineering tools. AIT is a regional international and non-profit institute with the vision of becoming a leading and a unique regional multicultural institution of higher learning, offering state of the art education, research and training in technology, management and societal development. ICUS and AIT signed an agreement towards developing joint research programs and to cooperate in developing strategies for tackling issues related to urban safety through RNUS.

RNUS focuses on collaborative research activities with different organizations in Asian countries in areas of urban safety engineering with advanced technology tools such as numerical models, remote sensing, GIS, GPS, etc. for devising appropriate methodologies for management and maintenance of urban buildings, infrastructures, mitigation of urban disasters and environmental problems for sustainable development of Asian cities with adequate safety and security.

2. Objectives of RNUS

Through RNUS, SCE and ICUS work together for

- advancement of urban safety engineering utilizing advanced engineering tools,
- establishment of collaborative research activities with other organizations in areas of urban safety engineering in Asian region, and
- establishment of a regional network of researchers for sharing information and resources in the field of urban safety engineering.

3. Functions of RNUS

RNUS spearheads initiative of collaborative research projects with researchers from Thailand and other Asian countries and

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sharing of information through the following activities.

- Research
- Collaborative Research Projects
- Information Dissemination (Seminars/Workshops/ Symposia/Conference/Publications)
- Network of Researchers
- Exchange of Staff

4. Highlights of Recent Activities

Since its inception, RNUS has undertaken several activities including collaborative research projects and academic activities with researchers of AIT and other organizations in Asia.

4.1 Collaborative Research Projects

With the support of ICUS, two pilot projects were initiated by RNUS in Bangkok, Thailand. It has received a grant from industry for a research project on flood modeling in the Mekong River Basin. Brief introductions of these three projects are presented below.

a) Development of database for deterioratied concrete bridges in Bangkok

This is one of the two pilot projects initiated by RNUS in collaboration with the researchers, scientists and engineers of Thailand as a start-up activity of the center. The participatory organizations in this project are RNUS, ICUS and the Thammasat University, Thailand (Tangtermsirikil, *et al.*, 2003).

b) Urban Flood Risk Mapping in Bangkok using GIS, RS and Mathematical Model

This is the second pilot project initiated by RNUS. The organizations involved in this project are RNUS, ICUS, AIT, Chulalongkorn University, and GISTDA (Geo-Informatics and Space Technology Development Agency), Thailand. Two of the most frequently flood affected districts of the Bangkok Metropolitan area are selected for this pilot project. The selected districts are Bangkapi (Area: 28.5 km^2, population: 0.143 million) and Bungkum (Area: 24.3 km^2; population: 0.137 million), both are adjacent districts located in the eastern side of the Bangkok City (Fig. 1). A major component of this project was to develop flood loss functions for Bangkok for flood risk mapping, which has been already completed (Fig. 2).

c) Research Project on Urban Flood Modeling in Mekong River Basin

This is a research project that aims at developing a system for urban flood inundation simulation in the Lower Mekong river basin. The project mainly focuses on physically based surface-river modeling for flood inundation simulation. The model will be developed with the objective of integrating it with airborne and space borne resources and numerical weather prediction models for designing an integrated flood warning system. An existing

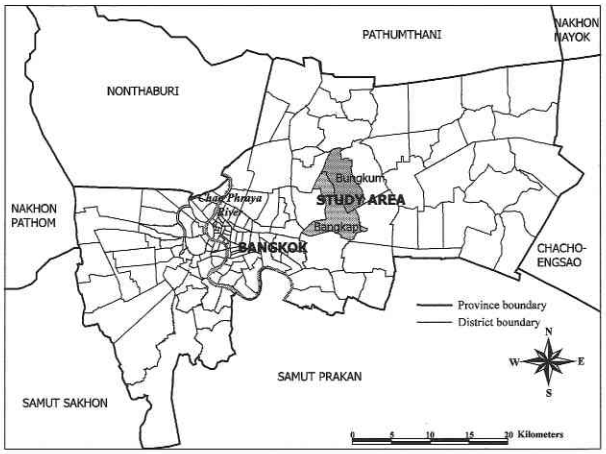

Fig 1: Location map of the study area

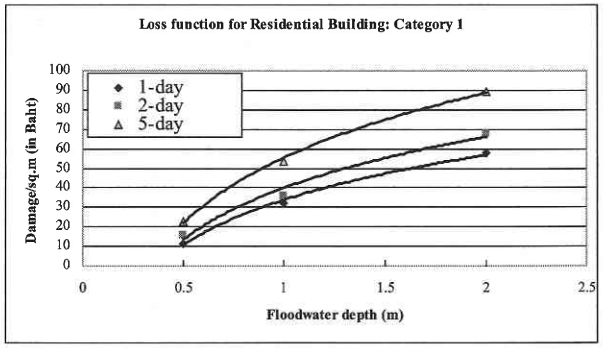

Fig. 2: Hypothetical depth-damage functions for residential building structures for different flood durations

mathematical model will be modified and improved for Mekong river basin.

4.2 Information Dissemination

During the last three months from October to December, 2003, RNUS has successfully organized various activities including one seminar and two workshops.

a) Seminar on Water Resources in 21st Century

RNUS and Water Engineering and Management field of SCE, AIT jointly organized a seminar on "Water Resources in the 21st Century under Climate Change Scenarios". Held on 14 November, 2003, the event gave a form for the discussion on issues on water resources under high stress and climate change. The event was graced by Guest Speaker Associate Professor Dr. Taikan Oki of the University of Tokyo, an internationally-renowned researcher in the field of land-atmosphere interaction, variation of global climate, global water resources analysis, virtual water, and isotope analysis. He was accompanied at the seminar by two of his colleagues from the University of Tokyo, Associate Prof. Dr. Shinjiro Kanae and Research Fellow Mr. Kei Yoshimura, who have been actively involved in various projects

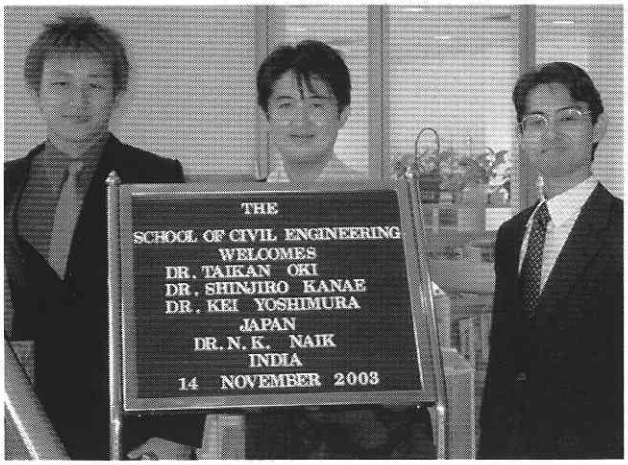

Photo 1: The three speakers at the Seminar

Photo 2: A snapshot during the workshop

including the GEWEX, GLASS, GSWP, and the IAHS PUB. The seminar was rated high by participants, which included visiting scholars from Japan, researchers from Thammasat University (Thailand), representatives from Thai Meteorological Division (TMD) and faculty members, staff and students from AIT.

b) Workshop on Collaboration between Yamanashi University, Japan and Research Organizations in Thailand

RNUS assisted the University of Yamanashi, Japan in organizing activities of the Workshop on "Collaborative Research and Education Program of the University of Yamanashi COE with Thai Organizations and AIT" that was held on 25 November, 2003 at the Conference Center of AIT. The objective of the workshop was to establish a strong tie for research collaboration between the University of Yamanashi, Japan and various water-related Thai organizations associated with AIT. The one-day activity was graced by Prof. Kuniyoshi Takeuchi of the Yamanashi University, who introduced the "UY COE Research and Education on Integrated River Basin Management in Asian Monsoon Region" and Prof. Kengo Sunada who talked about the

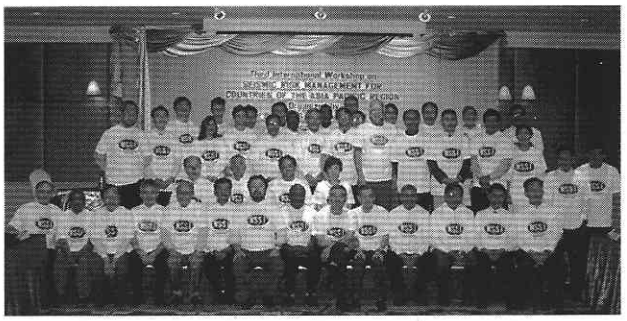

Photo 3: Workshop participants pose for a group photo

Fuji River Basin. Several experts from AIT and Thai organizations presented papers on hydrology and water resources in Thailand, water use management, water quality and solid waste management, among other topics.

c) Third International Workshop of WSSI

RNUS spearheaded the organization of the 3rd International Workshop of the World Seismic Safety Initiative (WSSI) on "Seismic Risk Management for Countries of the Asia Pacific Region" at the Miracle Grand Hotel in Bangkok during 7–8 December, 2003. WSSI is an undertaking of the International Association for Earthquake Engineering (IAEE) in support of the International Decade for Natural Disaster Reduction (IDNDR) of the United Nations. Since its inception in 1992, WSSI has been working with many countries around the world through its programs. To utilize and share the experiences learnt over the past ten or more years, WSSI 2003 was organized to allow participants: 1) to learn from countries where WSSI programs have made positive difference in terms of risk mitigation and management; 2) to learn from countries where WSSI programs have not made any major impact in terms of risk mitigation efforts, and 3) to develop a plan in consultation with all the attending countries about what WSSI should do for the next five years and where they should focus their human and financial resources. The workshop was attended by over 55 representatives from 19 countries.

5. Final Remarks

Rapid urbanization is a distinctive feature of Asia in addition to a tremendous rate of population growth. It is estimated that by 2015, more than 50 % of the mega-cities of the world are going to be in Asia and their urban development is going to continue in the decades to come. Holistic efforts are needed for urban safety and security. New technologies have inspired us to conduct research for new development in urban safety engineering, which should be integrated with socio-economic and environmental aspects to achieve the sustainable urban development for safer and securer 21st century. International collaboration among researchers and other stake holders is needed to target the local and regional prob-

lems with shared knowledge and technologies. RNUS is an initiative of ICUS and SCE, AIT in this direction and its success will be a demonstrative example to inspire further collaborative efforts in the region. There are much to do for RNUS to expand its activities of collaboration, which will in turn lead to regional collaboration and networking.

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Reference

Dutta, D. (2003). Analysis of Urban Flood Disaster trends in Asia, *Watershed Hydrology: Proceedings of the International Conference on Water and Environment*, Bhopal, India, December, pp. 512–519.

Dutta, D. and T. Tingsanchali (2003). "Development of Loss Functions for Urban Flood Risk Analysis In Bangkok", *Proceedings of the 2nd International Symposium on New Technologies for Urban Safety of Mega Cities in Asia, ICUS, IIS, The University of Tokyo*, October, pp: 229–238.

Dutta, D. and T. Uomoto (2002) (ed.). Urban Safety Engineering 2001: *Proceedings of the Joint Workshop, ICUS/INCEDE Report 1*, October.

Misra, S. and Y. Kato (2003) (ed.). New Technologies for Urban Safety of Mega Cities in Asia, *Proceedings of the International Symposium, ICUS Report 3*.

Tangtermsirikil, S., T. Kaewkhluab and K. Kaewmanee (2003). "Information Acquisition and Structural Health Monitoring of Bridges in Bangkok", *Proceedings of the 2nd International Symposium on New Technologies for Urban Safety of Mega Cities in Asia, ICUS, IIS*, The University of Tokyo, October, pp: 133–140.

Larimer, T. (2000). The Sky is Falling, *Time Magazine, USA*, Jan. 24.