Expert Consultation Workshop on

Enhancing Earthquake Resilience in Bangkok:

Review, Updates, and Risk Assessment

29th April 2025
The Jupiter Room 4 – 6
Muang Thong Thani
Bangkok, Thailand

LIST OF CO-ORGANIZERS AND SPONSORS

AGC
AGCBangkok Metropolitan Administration (BMA)
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Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior
Jorakay Corporation Company Limited (Head Office)
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National Disaster Warning Center (NDWC)
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The Association of Siamese Architects Under Royal Patronage (ASA)
The International Emergency Management Society (TIEMS)
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United States Geological Survey (USGS)

BACKGROUND

On 28 March 2025, a powerful 7.7-magnitude earthquake struck central Myanmar, causing widespread devastation and regional impacts. Tremors were strongly felt in Bangkok, leading to the collapse of a 33-storey building, resulting in official death toll of 44, 7 injuries, and over 50 people missing (15 April 2025). The incident has once again revealed critical gaps in Bangkok's earthquake preparedness and response capabilities. In light of this recent disaster, it is both urgent and necessary to revisit the outcomes of the 2011 Stakeholder Consultation Workshop on the Effects of Distant Large Earthquakes on Infrastructure in Bangkok, originally organized by the International Ocean Institute (IOI) in collaboration with the National Disaster Warning Center (NDWC) and other key stakeholders. This proposal recommends convening a follow-up workshop to assess progress since 2011, examine lessons learned from the 2025 earthquake, and chart a forward-looking plan to enhance Bangkok's and Thailand's resilience to distant seismic events.

The 2011 workshop was organized in Bangkok, Thailand. It brought together representatives from government agencies, the private sector, academic institutions, and NGOs. Key contributions included:

- Assessments of Bangkok's vulnerability to distant large earthquakes.
- Case studies and lessons learned from Japan, Mexico, Turkey, and the U.S.
- Discussions on legal frameworks, engineering solutions, and risk reduction strategies.
- Advocacy for private sector involvement in promoting public awareness.
- Introduction of TIEMS (The International Emergency Management Society) as a platform for advancing emergency management and disaster response in Thailand. A major recommendation was the establishment of a TIEMS Thailand Chapter, to connect national efforts with international expertise and foster sustained collaboration.

Some progress actions were made successfully since 2011. These are

- Pilot retrofit project by Bank of Ayudhya on its headquarters building.
- Strategic planning workshop (2012) based on a national capacity questionnaire survey, conducted by International Ocean Institute (IOI) and Institute of Earth Systems (IES)

However, several key actions were not implemented as planned, including:

- Retrofitting of schools and hospitals.
- Public awareness campaigns and education.
- Vulnerability assessments by NDWC in coordination with relevant agencies.
- Development of early warning and response systems.
- Establishment of the TIEMS Thailand Chapter.

In this regard, The International Emergency Management Society (TIEMS) and The Association of Siamese Architects Under Royal Patronage (ASA) and its partners in cooperation with the National Disaster Warning Center (NDWC), Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior; the Bangkok Metropolitan Administration (BMA), Miyamoto International, and Pacific Disaster Center (PDC) agreed that there is an urgent need to co-organize an expert consultation workshop on enhancing earthquake resilience in Bangkok: review, updates and risk assessment.

The United Nations Centre for Regional Development (UNCRD) informed that the impact of earthquakes on the livelihood of people can be reduced by measures such as adherence to earthquake resistant building designs and construction standards, proper planning, education and training. However, the risk is ever increasing as urbanization in developing countries is adding extra pressure on building construction. Although those countries have established a building construction system, it can seldom function effectively due to lack of awareness on disaster prevention in communities as well as lack of regulatory mechanisms for effective implementation, monitoring and reviewing[1].

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[1] UNCRD. 2009. From Code to Practice: Challenges for Building Code Implementation and the Further Direction of Housing Earthquake Safety. Records and outcomes of International Symposium 2008 on Earthquake Safe Housing, 28-29 November 2008, Tokyo, Japan.

Thailand, like vast regions of the Basin and Range, has not had a historic large-magnitude earthquake and therefore is not generally considered seismically active. The geologic record, however, suggests that these generally quiescent faults have been the source of large earthquakes and if earthquake processes are comparable to those in the Basin and Range Province, earthquakes as large as M7.1 to M7.3 may occur[2]. Though Bangkok is located at a remote distance from seismic sources, recent seismic hazard studies show that Bangkok is at risk from damaging ground motions induced by distant large earthquakes[3, 4, 5]. The risk is primarily caused by the ability of thick soft surficial deposits in Bangkok to amplify earthquake ground motions about three to five times. The destructive Andaman-Sumatra Fault to the west of the country and the Sagaing Fault in the east-central Burma basin to the northwest of Thailand are a few hundred kilometers from the nearest cities of the Kingdom[7]. Nine major fault systems have been identified in Thailand[6]. These include the Thoen Fault, Mae Sariang-Mae Hong Son Fault and Moei-Uthai Thani Fault in the northern and western parts of Thailand; Si Sawat Fault; three Pagoda Faults; Ranong Fault and the Ma Rui Canal Fault.

With human lives and livelihoods at stake, every measure capable of reducing risk and mitigating the impact of natural and human-induced disasters must be used to the fullest. This includes incorporating what is known of potential disasters in the planning of development and infrastructure, and taking steps today to lessen the effects of future disasters[7].

AIMS OF THE WORKSHOP

The workshop is entitled "Enhancing Earthquake Resilience in Bangkok: Review, Updates and Risk Assessment". The workshop will be built upon the discussions and recommendations from the 2011 conference and developed actionable strategies for enhancing Bangkok's resilience to distance large earthquakes. The workshop will provide a forum for relevant stakeholders, namely; the BMA, interagency governmental departments relevant to earthquake, private sector and business entrepreneurs, academic institutions, nongovernmental organizations as well as scientists and experts to review, to update and to address the current status of earthquake risks and hazards, to assess national and local capacities in end-to-end early warning and mitigation systems, to identify measures for adaptation and mitigation efforts, to share information and best practices in order to improve disaster prevention and mitigation arrangements for Bangkok.

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[2] Petersen, Mark, et al. 2007. Documentation for the Southeast Asia Seismic Hazard Maps. Administrative Report September 30, 2007. U.S. Department of the Interior, U.S. Geological Survey.

[3] Warnitchai, Pennung. 2004. Development of Seismic Design Requirements for Buildings in Bangkok Against the Effects of Distant Large Earthquakes. 13th World Conference on Earthquake Engineering, Canada.

[4] Ashford, Scott A., Warrasak Jakrapiyanun, and Panitan Lukkunaprasit. 2000. Amplification of Earthquake Ground Motions in Bangkok. 12 WCEE 2000.

[5] Lukkunaprasit, Panitan. State of Seismic Risk Mitigation in Thailand.

[6] Nutalaya, P., S. Sodsri, and E.P. Arnold. 1985. Series on Seismology. Volume II-Thailand, Southeast Asian Association of Seismology and Earthquake Engineering.

[7] Shirkhodai, Ray and Joseph Bean. 2008. Rapid Increasing Disaster Risks Demand Innovative, Evolutionary Disaster Management Technologies. In Risk Wise. p. 33-36.

EXPECTED OUTCOME

It will be a great opportunity to organize this follow-up workshop to review, update and consider risk assessment on seismic hazard in Bangkok from distant large earthquake and the interpretation of recorded ground motion; lesson learned from the recent earthquakes; enhancing building codes, public awareness and retrofitting; and strengthening emergency preparedness and response, and early warning systems.

PROGRAMME

Tuesday 29th April 2025

8:00 – 9:00 AM: Registration

9:00 – 9:30 AM: Opening Remarks

- **Mr. Asae Sukhyanga**, President, The Association of Siamese Architects under Royal Patronage (ASA)

- Representative of Bangkok Metropolitan Administration (BMA)

- Representative of Executive Director of Thailand's National Disaster Warning Center (NDWC), Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior

- Brief recap of the 2011 conference outcomes and progress made since then by **Mr. Harald Drager**, President, The International Emergency Management Society (TIEMS)

9:30 AM – 12:00 PM: Expert Presentation Session:
Moderated by **Dr. Cherdsak Virapat**, Regional Director for Asia, The International Emergency Management Society (TIEMS)

9:30 – 10:00 AM: Seismic Hazard in Bangkok from Distant Large Earthquake and the Interpretation of Recorded Ground Motion

- Presentation by **Assoc. Prof. Dr. Teraphan Ornthammarath**, Department of Civil and Environmental Engineering, faculty of Engineering, Mahidol University on the latest data and models for assessing earthquake risk in Bangkok, considering distant large earthquakes.

10:00 - 10:30 AM: Case Studies: Lessons from Recent Earthquakes

- Analysis of recent earthquake events in Myanmar and Thailand and implications on preparedness efforts by **Dr. Walter Mooney**, USGS, U.S.A.

10:30 – 11:00 AM: Strengthening Emergency Response and Early Warning Systems

- Presentations on improving early warning systems, communication protocols, and community-based disaster preparedness programs by **Mr. Arm Chintanadilok**, Section Directorof Academic for Disaster Warning, Thailand's National Disaster Warning Center (NDWC).

11:00 - 11:30 AM: Enhancing Building Codes, Public Awareness and Retrofitting

- Presentations on Impact of Myanmar Earthquake on Bangkok and Next Steps by **Dr. Kit Miyamoto**, Miyamoto International, U.S.A.

11:30 AM – 12:00 PM: Earthquake Data Analysis and Decision Support Technologies

- Presentation by **Ms. Victoria Leat**, Asia Program Advisor, Pacific Disaster Center (PDC Global)

12:00 – 12:15 PM: Reporting and Wrap-up: Concluding remarks and commitment to future collaboration.

DATE AND PLACE

29th April 2025, The Jupiter Room 4 – 6, Muang Thong Thani, Bangkok, Thailand

CONTACT INFORMATION

DR. CHERDSAK VIRAPAT,
Regional Director for Asia,
The International Emergency Management Society (TIEMS) Asia
Bangkok, Thailand
E-mail: cvirapat@gmail.com

Ms. USA KERDSIRI,
Administrative Officer,
National Disaster Warning Center, Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior
Bangkok, Thailand
Tel: +66 89 1074641;
Email: Usa_ke@hotmail.com;

EXPERTS

Mr. K. Harald Drager President, The International Emergency Management Society (TIEMS) NORWAY

Mr. Asae Sukhyanga, President,
The Association of Siamese Architects under Royal Patronage (ASA)

Associate Prof. Dr. Teraphan Ornthammmarath
Department of Civil and Environmental Engineering,
Mahidol University, THAILAND

Dr. Walter D. Mooney
United States Geological Survey (USGS),USA

Ms. Victoria Leat
Asia Program Advisor
Pacific Disaster Center (PDC Global)

H. Kit Miyamoto Ph.D., S.E., President & CEO
Miyamoto International U.S.A./JAPAN

Dr. Cherdsak Virapat
Regional Director for Asia
The International Emergency Management Society
(TIEMS), Bangkok, THAILAND

Mr. Arm Chintanadilok, Section Disaster Academic for Disaster Warning, National Disaster Warning Center (NDWC), THAILAND

Mr. K. Harald Drager,
President, International Emergency Management Society (TIEMS), Østvangveien 29, 0588 Oslo, Norway, Email: khdrager@online.no

K. Harald Drager, Oslo, Norway, is the founding member of the worldwide acting society TIEMS (The International Emergency Management Society - www.tiems.org), which he took the initiative to establish in 1993. He was the International Vice President of TIEMS since its inauguration until 2002, when he took over as TIEMS President, a position he was re-elected to for the 7th time in 2022. He has brought in new ideas and new people in TIEMS and succeeded the organization to span worldwide. TIEMS has under his leadership become a well-recognized organization with growing activities in Asia, Europe, Africa, Australia, and North America and Latin America and Caribbean. TIEMS has developed to a global well-known organization with a extended worldwide network of experts, and TIEMS arranges each year workshops and conferences with focus on disaster risk reduction. TIEMS has also initiated development of TIEMS International Certification Programs, TQC & TQAC (TIEMS Qualifications Certification and TIEMS Qualification Associate Certification in International Emergency and Disaster Management). TIEMS participates in research and development activities to improve systems, methods, and equipment in emergency management for achieving better societal resilience. Mr. Drager has extensive experience from industry and research activity, especially in emergency and risk management, and he acts as the Managing Director of QUASAR Invest AS in Norway, a consultancy in global safety, emergency, and disaster management. He has a master's degree in control engineering from the Norwegian Technical University in 1966 and a master's degree from Purdue University in USA in industrial engineering in 1973. Mr. Drager has done consultancy work for numerous clients internationally amongst others the World Bank/International Finance Corporation, NATO, and the European Commission, and he has been project manager of several international research and development projects for methods and software development in risk, emergency, and disaster management. He was employed by Det norske Veritas (DnV), http://www.dnv.com/ in 1967, and was a member of the Board of Directors of the company for 5 years until he left the company in 1983 and founded his own consultancy, AS QUASAR Consultants and later QUASAR Invest AS. He took the initiative to establish Safeware Quasar Ltd, in 1994, a 50 % owned company of AS QUASAR Consultants until 2009, providing bespoke chemical compliance software and training solutions. Mr. Drager has published numerous papers internationally on emergency, risk, and disaster management. Mr. Drager has also been a member of the advisory board/user boards of several EU projects. He was a European Commission appointed evaluator for the EU Security Calls for FP7 2013 and the Horizon 2020 Call for Secure Societies in 2014. He was appointed Professor Chair for 4 years in 2014 at King Abdul Aziz University in Jeddah, Saudi Arabia. He was also appointed Visiting Professor at North-Western University in Xian in China in 2016 for 2 years.

H. Kit Miyamoto, President & CEO Miyamoto International, Email: Kit@miyamotointernational.com

H. Kit Miyamoto, PhD, SE, is the CEO and a structural engineer for Miyamoto International, Global Risk Miyamoto and a nonprofit organization, Miyamoto Global Disaster Relief. Under his leadership, more than 12,000 projects have been successfully completed worldwide. Known for innovative engineering, Dr. Miyamoto has worked on many challenging projects that received industry recognition, including the Structural Engineers Association of California (SEAOC) Excellence in Structural Engineering Award.

Dr. Miyamoto holds graduate degrees from the Tokyo Institute of Technology and California State University, Sacramento. He was also awarded

Distinguished Alumni by California State University, Chico. He specializes in High-Performance Earthquake Engineering, as well as Disaster Mitigation, Response, and Reconstruction. Dr. Miyamoto was a director for SEAOC; is an American Society of Civil Engineers (ASCE) Fellow; and has served on many code-writing organizations, including the ASCE 7 Seismic Task Committee. Dr. Miyamoto was also an adjunct professor at California State University. Dr. Miyamoto continues to work on major critical projects, including his role as an expert consultant to the World Bank on the seismic risk mitigation project for 2000 schools in Istanbul. He worked with the government of Haiti and the United Nations to conduct assessments on more than 400,000 earthquake-damaged structures. He is also working with the government of Haiti, the United Nations, the United States Agency for International Development, and various nongovernmental organizations to implement reconstruction strategies for Haiti. Dr. Miyamoto is a frequent international media spokesperson on earthquake structural engineering issues.

Dr. Walter D. Mooney,
United States Geological Survey, U.S.A., Email: mooney@usgs.gov

Walter Mooney is a research seismologist and geophysicist at the U.S. Geological Survey, Menlo Park, California (See video presentation). He is also a AGU member since 1974 (and Fellow since 1996). His major interest is global Earth crustal structure and tectonics, particularly of the continental lithosphere. Mooney was the branch Chief of Seismology from 1994 to 1997. He has led field work throughout North and South America and participated in extensive research affiliations with colleagues in Mexico, Europe, Russia, China and Taiwan, Japan, India, Australia, New Zealand, East Africa.
Mooney is a consulting Professor of Geophysics, Stanford University, and a visiting faculty at the following institutions: University of Karlsruhe and Kiel University, Germany, University of Paris and University of Strasbourg, France, Rice University, and the California Institute of Technology. Finally, he is the Program Leader for the USGS contribution to the Indian Ocean Tsunami Warning System and has extensive experience at leading training.

Associate Prof. Dr. Teraphan Ornthammmarath
Department of Civil and Environmental Engineering, Mahidol University, THAILAND

Teraphan Ornthammarath is an Associate Professor in the Department of Civil and Environmental Engineering at Mahidol University in Thailand. He specializes in earthquake engineering and engineering seismology, with expertise in seismic hazard assessment, seismic design, structural dynamics

Education and Academic Background

- Ph.D. in Earthquake Engineering & Engineering Seismology
  ROSE School, Italy (2010)

- M.Sc. in Earthquake Engineering & Engineering Seismology
  ROSE School, Italy, and Université Joseph Fourier, France (2007)

- B.Eng. in Civil Engineering
  Sirindhorn International Institute of Technology, Thailand (2000)

Ms. Victoria Leat, Asia Program Advisor, Pacific Disaster Center (PDC Global), +66 (0) 9234 92456, vleat@pdc.org | www.pdc.org

Since 2009, Ms. Leat has been involved disaster risk reduction project planning and implementation, as well as community risk and vulnerability assessments in international settings. She has extensive experience as the operations manager of a capacity development social enterprise, in addition to partnership and network development. As the Asia Program Advisor for the PDC, Ms. Leat facilitates program implementation, builds local stakeholder relations, and identifies new areas of cooperation and project work. She also provides direct support to local stakeholders and leads PDC training activities for its DisasterAWARE® deployments in Southeast Asia.

Mr. Arm Chintanadilok, Section Disaster Academic for Disaster Warning, National Disaster Warning Center (NDWC), THAILAND

Arm Chintanadilok obtained his LL.B. (Laws) at Siam University in Bangkok Thailand and M.P.A at the National Institute of Development Administration (NIDA) in Bangkok Thailand. He started his career as Government Official at the Department of Local Administration (DLA), Ministry of Interior in 2004. He then worked for the Office of the Permanent Secretary Ministry of Interior in 2016. He has worked for the Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior from 2021 to the present time. His works are focusing on analysis and monitoring of natural disaster factors and modern innovation and information technology of Early warning systems. He is interested in the field of modelling, data analytics, and decision support systems for the efficiency of early warning systems.

Dr. Cherdsak Virapat, Regional Director for Asia, The International Emergency Management Society (TIEMS), Bangkok, THAILAND

Cherdsak Virapat is TIEMS Regional Director for Asia. Cherdsak Virapat has been working in the field of end-to-end multi-hazard early warning and mitigation systems for 20 years now. He had been appointed Chief Executive Officer (CEO) of four organizations during the last 16 years (2008-2024). These are Executive Director, International Ocean Institute Headquarters (IOI HQ) in Malta (2008-2014); Director General, Network of Aquaculture Centres in Asia-Pacific (NACA), Inter-Governmental Organization, Bangkok, Thailand (2014-2019); Executive Director, International Institute for Trade and Development (Public Organization), Ministry of Commerce, Royal Thai Government, Bangkok, Thailand (Regional Institute) established in collaboration with the United Nations Conference on Trade and Development (UNCTAD) (2019-2020); Director General, Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP), Inter-Governmental Organization, Dhaka, Bangladesh (2020–2024). He has been associated as a resource person of the International Emergency Management Society (TIEMS) since 2011.