



GP-RSS Symposium

International Joint Graduate Program
in Resilience and Safety Studies (GP-RSS), Tohoku University



India – Japan Joint Research

on policy-making support framework for disaster risk reduction
and sustainable urban development

Session 1: Understanding Natural Hazard Exposure (13:30 – 15:45)

Seismic Risk (13:30 – 15:00)

- **Probabilistic Seismic Risk Assessment of the Building Infrastructure in Mumbai city**
Dr. Manish Kumar (Associate Professor, Department of Civil Engineering, IIT Bombay)
- **Control and identification of nonlinear structural systems for earthquake engineering**
Dr. Ryuta Enokida (Associate Professor, International Research Institute of Disaster Science, Tohoku University)
- **Rapid Assessment of Railway Bridges after Seismic Event**
Dr. Alok Goyal (Professor, Department of Civil Engineering, IIT Bombay)
- **Investigation on Building Damage Rates and Ground-Motion Characteristics in the 2011 Tohoku Earthquake, Japan**
Dr. Susumu Ohno (Associate Professor, International Research Institute of Disaster Science, Tohoku University)
- **Repurposing telecom fibers for urban seismic hazard assessment**
Dr. Bharath Shekar (Associate Professor, Department of Earth Sciences, IIT Bombay)

Flood Risk (15:00 – 15:45)

- **Managing water infrastructure: engineering and social aspects**
Dr. Riddhi Singh (Associate Professor, Civil Engineering Department, IIT Bombay)
- **Flood adaptation and mitigation in Japan under climate change**
Dr. So Kazama (Professor, Graduate School of Engineering, Tohoku University)

Session 2: Formulating and Implementing DRR (16:00 – 17:50)

Disaster Risk Reduction in Mumbai, India (16:00 – 16:30)

- **A disaster risk management master plan (DRMMP) for Mumbai - Key considerations**
Dr. Ravi Sinha (Professor, Department of Civil Engineering, IIT Bombay)

Socio-economic factors for DRR (16:30-17:50)

- **Investment for resilience and reducing poverty through flood control**
Dr. Akiyuki Kawasaki (Professor, Institute for Future Initiatives and Dept. Civil Eng., The University of Tokyo)
- **City in the water, water in the city: anthropological perspectives**
Dr. Aya Ikegame (Professor, Graduate School of Asian and African Area Studies, Kyoto University)
- **Spatial analysis of real estate price data: Two different approaches focusing on spatial autocorrelation and spatial heterogeneity**
Dr. Ryo Inoue (Associate Professor, the Graduate School of Information Sciences, Tohoku University)

Session 1: Understanding Natural Hazard Exposure

Seismic Risk (13:30 – 15:00)



Manish Kumar, Ph.D.

Associate Professor, Department of Civil Engineering, IIT Bombay

Title: “Probabilistic Seismic Risk Assessment of the Building Infrastructure in Mumbai city”

The talk will discuss the methodology for probabilistic seismic risk assessment of the building infrastructure in Mumbai city. Different aspects of the methodology and the underlying concepts (e.g., seismic hazard assessment, fragility, loss calculation) would be discussed. The proposed methodology would help in identifying critical infrastructure issues that may need special attention and would assist in future decision-making related to city planning and expansion.



Ryuta Enokida, Ph.D.

Associate Professor, International Research Institute of Disaster Science, Tohoku University

Title: “Control and identification of nonlinear structural systems for earthquake engineering”

Structural systems at earthquakes often exhibit severe nonlinear characteristics due to the structural damage or large responses. Understanding the characteristics is a key to controlling seismic responses and maintaining structures at the post-earthquake situation. We introduce our latest research on controlling actuation systems involving nonlinear systems, monitoring seismically damaged structures and realizing a cost-effective base isolation system.



Alok Goyal, Ph.D.

Professor, Department of Civil Engineering, IIT Bombay

Title: “Rapid Assessment of Railway Bridges after Seismic Event”

Rapid assessment of a large number of railway bridges, essential to supply chain for post seismic event relief and recovery, is required in a very short duration to assess their functionality. A two-way approach for bridges is to first use global indices to identify any distress or loss of integrity, and then do the detailed inspection and testing to quantify the damage. There are two major constraints in developing a workable system: it should enable rapid bridge integrity assessment for a large number of bridges, and the measured variables should have engineering significance in a decision support system. One of the research proposals initiated by Indian Railways is to develop framework for creating and updating database of structural performance parameters under standard loads based on field measurements so that these parameters could be rapidly measured and used to assess the condition of bridge for operational purpose.



Susumu Ohno, Ph.D.

Associate Professor, International Research Institute of Disaster Science, Tohoku University

Title: “Investigation on Building Damage Rates and Ground-Motion Characteristics in the 2011

Tohoku Earthquake, Japan”

The survey results for building vibration damages in Iwate, Miyagi, Fukushima prefectures caused by the 2011 Tohoku earthquake (M9.0), Japan, are summarized. Relationships between damage rates and strong motion indices are investigated for wooden buildings with the classification by building age. The period and damping dependence of damage rates are discussed and fragility curves for wooden houses are estimated.



Bharath Shekar, Ph.D.

Associate Professor, Department of Earth Sciences, IIT Bombay

Title: “Repurposing telecom fibers for urban seismic hazard assessment

The ubiquitous fiber optic cables in urban areas may be repurposed for seismic hazard monitoring. By installing distributed acoustic sensing (DAS) interrogators at regular intervals, the telecom fibers can be converted into thousands of virtual seismic sensors. In this talk, we will discuss a few case studies and explore the possibility of urban seismic hazard assessment with such DAS systems.

Session 1: Understanding Natural Hazard Exposure Flood Risk (15:00 – 15:45)



Riddhi Singh, Ph.D.

Associate Professor, Department of Civil Engineering, IIT Bombay

Title: “Managing water infrastructure: engineering and social aspects”

Planning of large water infrastructure remains critical for socioeconomic development globally. I will highlight key challenges that emerge while designing such projects that involve multiple stakeholders and have multi-decadal life time. These concepts and mathematical approaches are also relevant for disaster risk reduction. The talk ends with an overview of flood risks in Mumbai with a focus on socioeconomic aspects.



So Kazama, Ph.D.

Professor, Graduate School of Engineering, Tohoku University

Title: “Flood adaptation and mitigation in Japan under climate change”

A flood simulation is applied to whole Japan to evaluate impacts in the future and adaptation options. 2D non-uniform flow is modeled to obtain the inundation depth and duration, which are used for calculation of flood damage in each land use according to the economic manual for flood protection.

Session 2: Formulating and Implementing DRR (16:00 – 17:50) Disaster Risk Reduction in Mumbai, India (16:00 – 16:30)



Ravi Sinha, Ph.D.

Professor, Department of Civil Engineering, IIT Bombay

Title: “A disaster risk management master plan (DRMMP) for Mumbai - Key considerations”

Mumbai is India’s largest city and its commercial capital. About 60 percent of Mumbai’s population of approximately 13 million lives in slums, which are particularly vulnerable to disasters. Furthermore, a significant number of non-slum buildings are found to be dilapidated. Mumbai’s transport, water supply, sewerage, storm water drainage, and solid waste disposal systems are also highly vulnerable. The city experiences frequent hydro-meteorological disasters and has moderate seismic risk. A Disaster Risk Management Master Plan (DRMMP) for Greater Mumbai was recently developed. The key considerations of DRMMP will be discussed during the seminar.

Session 2: Formulating and Implementing DRR (16:00 – 17:50) Socio-economic factors for DRR (16:30-17:50)



Akiyuki Kawasaki, Ph.D.

Professor, Institute for Future Initiatives and Dept. Civil Eng., The University of Tokyo

Title: “Investment for resilience and reducing poverty through flood control”

Our aim is to support the formulation of investment plans that contribute to reducing flooding and poverty through climate adaptation, with the goal of correcting socio-economic disparities and promoting development. This presentation summarizes the field studies on widening inequality due to recurrent flooding and a modeling exercise on the improvement of livelihoods of residents induced by flood control measures.



Aya Ikegame, Ph.D.

Professor, Graduate School of Asian and African Area Studies, Kyoto University

Title: “City in the water, water in the city: anthropological perspectives”

Mumbai, a city made up of scattered islands in a swamp, has become a major commercial hub in the world. However, water poses a significant challenge for the city, as it weakens the city's structure and causes scarcity for its population of over 21 million people. This presentation focuses on recent literature related to Mumbai's water issues from an anthropological perspective.



Ryo Inoue, Ph.D

Associate Professor, the Graduate School of Information Sciences, Tohoku University

Title: “Spatial analysis of real estate price data: Two different approaches focusing on spatial autocorrelation and spatial heterogeneity”

I will introduce two approaches to real estate price data analysis that I have been working on. The first half of the presentation will introduce the estimation (interpolation) of real estate prices at any time and place, focusing on spatio-temporal autocorrelation. Then, the second half will introduce an analysis of the geographic segmentation of the real estate market, where the evaluation of the determinants of real estate prices differ from place to place, focusing on spatial heterogeneity.

Moderator:

Kozo Nagami, Ph.D.

Specially Appointed Professor, Green Goals Initiative, Tohoku University

Commentators:

Tatsuhiko Kono, Ph.D.

Professor, Graduate School of Information Sciences, Tohoku University

Daisuke Komori, Ph.D.

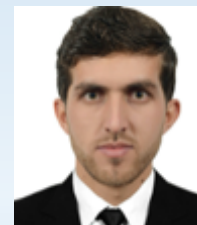
Specially Appointed Professor, Green Goals Initiative, Tohoku University

Yo Fukushima, Ph.D.

Associate Professor, International Research Institute of Disaster Science, Tohoku University

Sedigi Mohammad Naser, Ph.D.

Post-doctoral research fellow, Green Goals Initiative, Tohoku University



Venue & Time

March 8, 2024 (13:30 p.m. – 18:00 p.m.)

**Main conference room, 3rd floor, GSES main building
AOBAYAMA CAMPUS TOHOKU UNIVERSITY**