



# ICUS

International Center for Urban Safety Engineering,  
Institute of Industrial Science, The University of Tokyo

## Annual Report 2012

ICUS is composed of three research divisions - 'Urban Safety and Disaster Mitigation,' 'Environment Informatics,' and 'Social Infrastructure Management,' - which form the core research works. Activities in these fields are intended to fulfill the objectives of 'Promotion of advanced research,' 'Construction of networks,' and 'Information collection and dissemination.'

### Urban Safety & Disaster Mitigation Division

- urban safety and disaster mitigation strategy
- development of temporal-spatial disaster process model
- implementation of earthquake safer masonry structures
- development of proper disaster broadcast model by mass-media
- development of IT triage system
- effective use of information for disaster management
- development of support system for establishment of regional disaster management plan and its implementation
- development of assessment method of urban vulnerability to natural hazard
- restructure of urban disaster planning theory for disaster reduction
- post-disaster recovery and rehabilitation planning



### Social Infrastructure Management Division

- life cycle and stock management of infrastructure
- technology management
- ground maintenance and sustainability
- ground improvement

### Environment Informatics Division

- assessment and adaptation to climate change
- application of remote sensing technology to great disaster
- monitoring and conservation of ecosystem
- disaster information dissemination to diverse communities including foreigners in urban areas and farmers in agricultural and mountains in Asia
- poverty reduction through flood risk reduction
- environmental development and transboundary cooperation

# Urban Safety & Disaster Mitigation Division

Urban Safety & Disaster Mitigation Division

International Center for Urban Safety Engineering

Social Infrastructure Management Division

Environment Informatics Division

## Research Themes

- integrated information system for total disaster management
- low-cost and efficient retrofitting method for masonry structures considering local availability, applicability and acceptability
- estimation of electric power demand after large-scale earthquake disaster
- development of proper disaster broadcast model by mass-media for effective and efficient disaster responses during the time of digital broadcasting.
- development of temporal-spatial disaster process model
- IT triage system (TRACY) for sharing medical information during large scale disasters
- effective use of earthquake early warning in manufacturing companies
- distribution of evacuation space / buildings during large-scale metropolitan flood
- earthquake disaster management strategy and damage estimation
- urban strategy for evacuation planning against large-scale flood
- local community collaborative activities adaptable for climate change in below-sea-level cities
- comprehensive method of advanced community-based activities and planning for disaster management
- image training for urban rehabilitation and reconstruction planning as preparation for social recovery
- study on advanced community governance through practical approach to support affected fishermen villages by the Great East Japan Earthquake Disaster
- service continuity management (SCM) model of university in preparation for emergency
- trend analysis on research field and efficient research system for disaster reduction
- disaster response of local governments at southern area of Kii Peninsula after flood and sediment disaster due to the Typhoon Talas

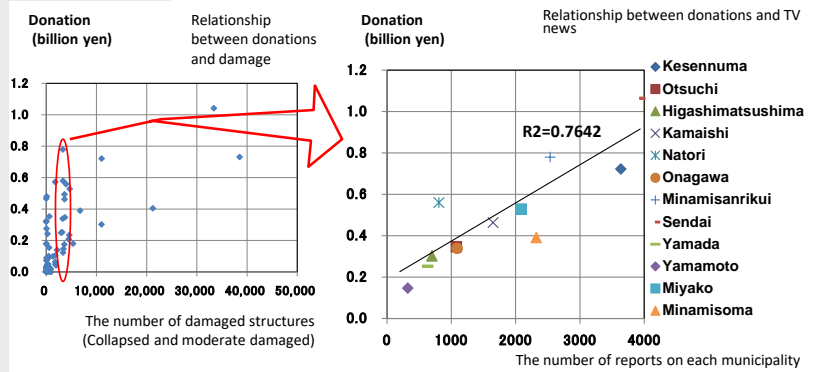


Development of effective retrofitting technology considering economical conditions and of social system for propagate its.



Development of new tsunami disaster mitigation system

## Projects



Development of proper mass media disaster report model to contribute effective disaster reduction

### Grant-Aid for Scientific Research

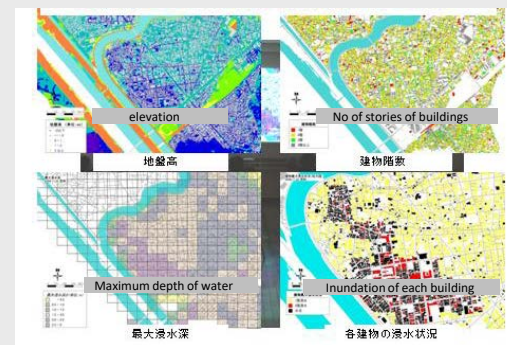
- analysis of policy for the crisis-management system as disaster countermeasures
- worst-case disaster scenario as a "national crisis" and its management system
- development of sustainable disaster management system
- vulnerability management in poor areas in Asian mega cities under climate changing
- connecting land use management measures with flood hazard map for European countries
- development of disaster information database and extraction of items for making disaster management manual for isolated area

### Research Promotion Fund

- study on utilization of flood hazard information in urban plan and possibility of risk reduction by urban planning
- development of support technology packages for empowerment of local community and growth of sustainability
- design of disaster and environmental information archive and development of education program
- institution of promotion for a fire-proof and earthquake-proof city
- improvement strategies of disaster response capacity for urban disaster
- disaster management of lifeline considering the inter-related network with other systems
- seismic response analysis of stonewall by discrete element method
- development and implementation of remote building assessment system for large-scale earthquake disasters
- study on special distribution of Tsunami evacuation spaces and buildings considering future depopulation

### Others

- development of tools that support local community continuity plans (LCCP)
- research on functional building for disaster management
- development of proper disaster mass media report model to contribute effective disaster response in digital broadcasting and communication convergence era
- new tsunami evacuation facilities to save vulnerable people from the huge tsunami



Development of a disaster mitigation activity package for enhancement of community capacity

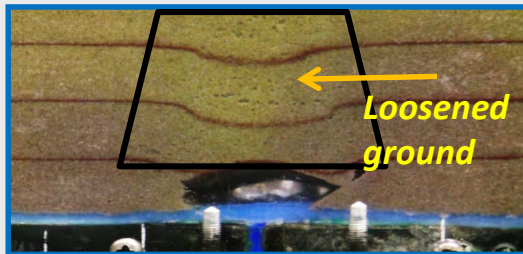


An application based on AR for smart phone, called "Tensai! Manabu-kun"

# Social Infrastructure Management Division

## Research themes

- formation and evaluation of sustainable construction materials based on social perspectives
- life-cycle management of civil infrastructure
- structural performance evaluation of un-reinforced concrete coastal facilities
- mechanism of combined deterioration of concrete with freezing-thawing and chloride attack
- effects of underground structure on the formation and expansion of subsurface cavity
- evaluation of long-term behavior of earthen structure
- effects of internal erosion on the stability of earthen structure
- development of sensors for the evaluation of dynamic properties of un-cemented soil
- assessment of performance degradation of deteriorated infrastructure
- anchorage performance of RC structures
- mechanics of fiber reinforced concrete under principal stress rotation
- effective press-in driving method
- infrastructure management for aging and depopulation society



Evaluation of loosened ground due to internal erosion



Crack evaluation of coastal structures

## Projects

### Grant-in-Aid for Scientific Research

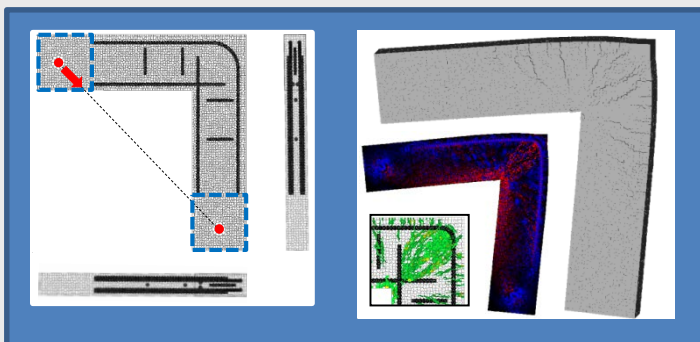
- rational management of old earthen structure with the evaluation of its soundness
- integrated evaluation toward the practical use of robust fiber reinforced cementitious composites
- paradigm shift of design code of detailing of RC structures
- structural performance assessment of un-reinforced concrete coastal facilities

### Cooperative Researches

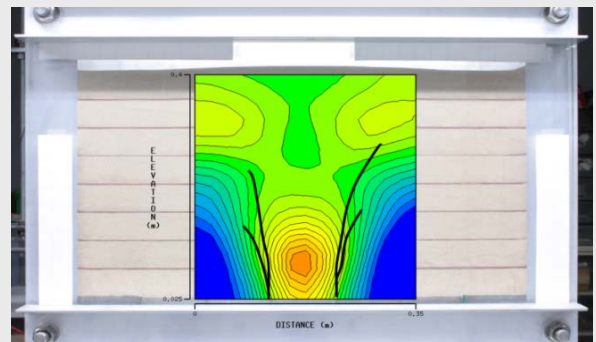
- study on subsurface cavities in the liquefied ground due to the 2011 Great East Japan earthquake
- performance of mechanical anchorage system for RC structures
- develop of effective pile driving method

### Others

- development of effective countermeasures for buried lifeline pipes against liquefaction



Investigation of anchorage performance of reinforced concrete by discrete analysis method



Evaluation of stress distribution in the model ground using elastic wave tomography



Inspection of concrete structures in Myanmar



# Environment Informatics Division

## Research Themes

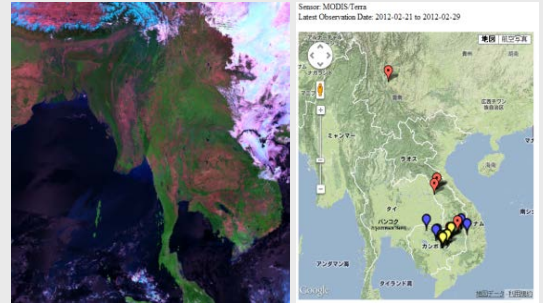
- operational use of remote sensing for great disaster
- automatic monitoring system for flood and forest development in the Indo-China
- development of three dimensional measurement method for ecosystem structures using LiDAR
- carbon dynamics in Brazilian Amazon
- development of historical dataset of land cover and land use based on remote sensing
- investigation on emergency response activities by Thailand government during the Chao Phraya River flood
- disaster information dissemination for diverse communities including foreigners during disasters
- investigation on the use of social media during disasters
- development of disaster information dissemination system for local community in agricultural and mountainous area in Asia
- effect of introduction of housing water tanks to store rainwater on improving urban environment and disaster risk reduction



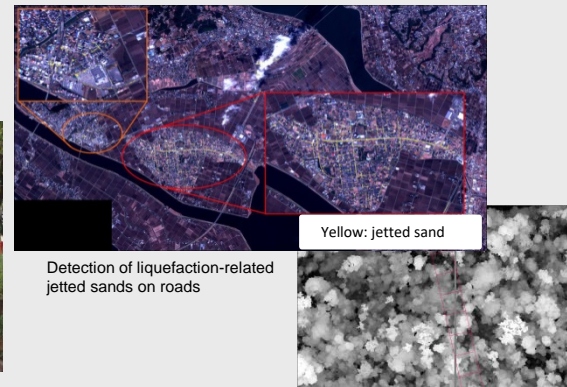
Workshops on disaster information dissemination in agricultural and mountainous area in Thailand (left) and Bangladesh (right)



Field investigation on flood and poverty in Myanmar and Thailand



Automatic deforestation development detection system using MODIS



Detection of liquefaction-related jetted sands on roads

Forest height estimation by LiDAR

## Projects

### Grant-in-Aid for Scientific Research

- system design and proposal of technological strategy of disaster information dissemination system supporting local community in agricultural and mountainous areas in Asia

### Research Promotion Fund

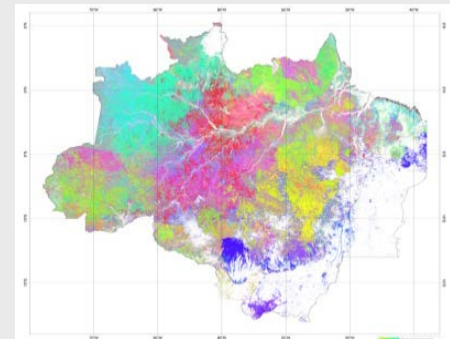
- carbon dynamics of Amazonian forest (CADAF)
- development of quantitative assessment and simulation model of forest dynamics in tropical Asia

### Cooperative Researches

- study on advanced 3-dimensional measurement using satellite wave pulse laser
- biomass mapping of Amazon forest
- detection of liquefaction-related jetted sands using satellite image

### Others

- a consideration of a suitable water resources management boundary for climate change adaptation in international river basins
- policy suggestion and technological strategy for reducing catastrophic disaster risk in Asia



Stand environment map in Amazon

## ICUS Project

### Research on High-dense Wooden Structure City in 2012

This research aims and purposes fresh planning of low-rise and high-dense wooden structure city by applying latest infrastructure technologies and disaster protection technologies. (ICUS & buildinglandscape)

## ICUS Project

### Research Committee 81

The object of RC81 is to work out a kind of improved and secured urban technology package to prepare for the coming mega flood in mega-cities.



Protect modern houses and solve their problems by new technologies and facilities set by block unit.

date	hours	name	Course title
Dec.4-6	9	Prof. Haruo Sawada	Geospatial technologies 1: History of remote sensing
Dec.18-20	12	Dr. Akiyuki Kawasaki	Geospatial technologies 2: Introduction to geographic information system
Jan. 7-8	6	Prof. Ryosuke Shibasaki	Geospatial technologies 3: Advanced geo-spatial data analysis
Jan.15-17	12	Dr. Wataru Takeuchi	Geospatial technologies 3 Application of remote sensing
Jan.29-31	9	Dr. Reiko Kuwano	Infrastructure management 1: Geotechnical and geo-environmental engineering
Feb.19-21	9	Dr. Hiroshi Yokota	Infrastructure management 2: Infrastructure management for developed society
Mar. 15	6	Prof. Kimiro Meguro	Total disaster management system and strategy

## Activities

- 04/16 @IIS **22<sup>nd</sup> ICUS Open Lecture**  
 「Consideration of Recovery from Great East Japan Earthquake and Tsunami Disaster from the Bird View」
- 05/20 @IIS **23<sup>rd</sup> ICUS Open Lecture**  
 「Reports of Current Situation from Affected Areas by the Great East Japan Earthquake Disaster」
- 06/01-02 @IIS **Open House**
- 08/20-21 @Chulalongkorn Univ. Bangkok (Thailand) **5<sup>th</sup> Joint student seminar on civil infrastructure**
- 09/24-28 @The 15<sup>th</sup> WCEE (World Conference of Earthquake Engineering), Lisbon (Portugal), ICUS booth was exhibited.
- 10/10-12 @Ulaanbaatar (Mongolia) **USMCA 2012**  
 「11th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia」
- 07/28 @IIS **24<sup>th</sup> ICUS Open Lecture** 「Sharing Present Challenges of Fukushima」
- 03/04 @IIS **25<sup>th</sup> ICUS Open Lecture** 「High-dense wooden structure city」
- 03/24 @IIS **26<sup>th</sup> ICUS Open Lecture** 「The present situation and future directions for post-disaster recovery in Minami-sanriku: a view from the citizen's perspective」



22<sup>nd</sup> ICUS Open Lecture on 16, April



5<sup>th</sup> Joint student seminar on civil infrastructure in Bangkok, Thailand on 20 and 21, August

## USMCA

Place : Conference center of Government House (Ulaanbaatar, Mongolia)  
 No. of participants : 153

### Keynote speakers:

- Prof. B. Damdinsuren (Professor, President of Mongolian University of Science and Technology)  
*The role of universities in urban safety and security*
- Dr. Yoshifumi Yasuoka (Center for Research and Development Strategy, Japan Science and Technology Agency)  
*Modeling and simulation of urban dynamics for integration of urban service infrastructures*
- Visiting Professor Yasuyoshi Ichihashi (ICUS)  
*Impacts of the Fukushima Daiichi NPS accident and Japan's long-term energy & environment policies*
- Dr. S. Demberel (Research Center for Astronomy and Geophysics, Academy of Sciences of Mongolia)  
*Estimation of seismic risk for central Ulaanbaatar using building stock inventory*
- Dr. Taketo Uomoto (Chief Executive, Public Work Research Institute, Japan)  
*Importance of maintenance to utilize existing structures*



Visit to Thermal Power Plant #4 on 12, October



Group photo of participants at Chinggis Khan Monument in front of the Government House on 10, October



Young-Researcher- Award recipients on 11, October



## Research Publications

	Urban Safety & Disaster Mitigation Division	Social Infrastructure Management Division	Environment Informatics Division
IIS Bi-monthly Research Report	17	8	18
Books/Translated Books	3	2	0
Reviewed Papers/Journal Papers	23	16	11
Conference Papers (International)	26	18	8
Conference Papers (Domestic)	27	15	16
Survey Reports	0	0	3
Others	20	6	2
<b>Total</b>	<b>116</b>	<b>65</b>	<b>58</b>

## Activities Recognized

name	month		title	organizer
Mikio KOSHIHARA	May	Prize of AIJ 2012	Specific contributions in division preservation and sustainable utilization of Hizuchi Elementary School, which is a representative work of wood-frame modern architecture	Architectural Institute of Japan
Makoto FUJIIU (Ohara lab.)	June	Excellent Presentation Award	Study on implementation of building damage assessment of local governments after the 2011 off the Pacific coast of Tohoku Earthquake	Institute of Social Safety Science
Yoshiyuki TAKANO (Nagai lab.)	Aug.	Excellent Presentation Award	An Analytical Investigation of Anchorage Failure of RC Confined by Transverse Bar by 3D RBSM	5th Joint Student Seminar on Civil Infrastructure
Mikio KOSHIHARA	Sept.	World Monuments Fund/Knoll Modernism Prize	Restoration of Hizuchi Elementary School	World Monuments Fund/Knoll
Indiketiya Hewage, Samantha Renuka (Kuwano lab.)	Sept.	Furuichi award (Best presentation award, master degree students at the department)	Evaluation of ground loosening behavior and mechanical properties of loosened sand associated with underground cavities	Civil Engineering Department, The University of Tokyo
Koichiro IKUTA (Nagai lab.)	Sept.	Excellent Presentation Award	Three-Dimensional Analysis of Flow of Fresh Concrete as Two Phase Model by MPS	Japan Society of Civil Engineers
X.Xu (Kato lab.)	Oct.	Best Young Researcher Poster Presentation Award	Vulnerability assessment of snow disaster based on traffic system: A case study of Chenzhou City in Hunna Province	USMCA2012
Koichiro IKUTA (Nagai lab.)	Oct.	Best Young Researcher Presentation Award	Numerical Simulation of Beam-Column Joint with Simple Reinforcement Arrangement by Three-dimensional RBSM	USMCA2012
Yasmin Bhattacharya (Kato lab.)	Nov.	Best Poster Presentation Award	Potential for thermal benefits in low-cost seismic retrofitting technology	Institute of Social Safety Science
Kohei NAGAI	Dec.	4th IPA Research Grand Award	Three-dimensional analysis of particles movement around tip of pile during press- in driving	International Press-in Association
Kohei NAGAI	Dec.	Best Paper Award	An analytical investigation of anchorage performance of mechanical anchorage by 3D discrete model	The 4th Asia-Pacific Young Researchers & Graduates Symposium
Saleem Muhammad Umair (Meguro lab.)	Dec.	Best Paper Award	Modification of 3d-applied element method for numerical simulation of out of plane behavior of polypropylene and fiber reinforced polymer composite retrofitted masonry wall systems	The 1st International Symposium on Earthquake Engineering

## Graduated students

	Urban Safety & Disaster Mitigation Division	Social Infrastructure Management Division	Environment Informatics Division
Undergrad	4	0	0
Master's course	12	3	5
Ph D course	6	2	0
<b>Total</b>	<b>22</b>	<b>5</b>	<b>5</b>

## Publications

**ICUS News Letter** Volume 11, No. 4, Volume 12, Nos. 1~3

**ICUS Report 2012/01-06**

**01: BNUS ANNUAL REPORT - 2012**

**02: 5<sup>th</sup> Joint student seminar on civil infrastructure August 20-21, 2012**

**03: USMCA 2012, 11<sup>th</sup> International Symposium on New Technologies for Urban Safety of Mega Cities in Asia**

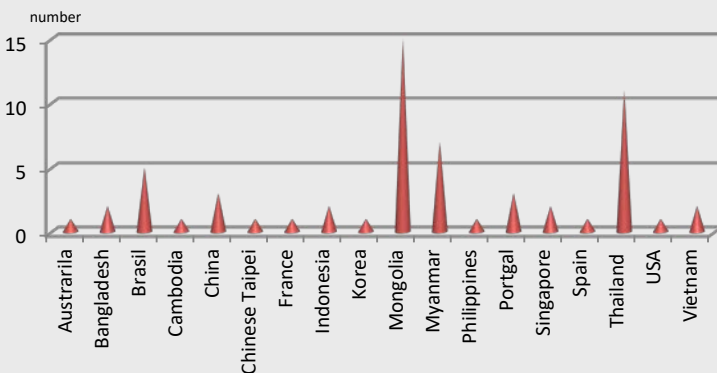
**04: 21<sup>st</sup> ICUS Open Lecture**

**05: Report on high-dense wooden structure city Annual Report 2010-12**

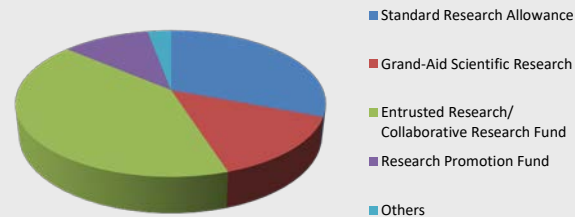
**06: Considering next disaster based on lessons from the 2011 Tohoku earthquake and tsunami disaster**

**Annual Report (2012)**

## Business trip



## Budget



# Memorandum of Understandings

- School of Applied Sciences and Engineering, Monash University, Gippsland Campus (Australia)
- National Centre for Earthquake Engineering (Bangladesh)
- Bangladesh Earthquake Society (Bangladesh)
- Department of Civil Engineering, Bangladesh University of Engineering and Technology (Bangladesh)
- Indian Institute of Technology, Kanpur (India)
- Department of Civil Engineering, Shibaura Institute of Technology (Japan)
- LCM Research Center, The Port and Airport Research Institute (Japan)
- Global U-City Construction & Information, Hub Dept. of Civil Engineering, Han Yang University (Korea)
- NIDP, National Emergency Management Agency, Seoul, Korea (Korea)
- NSET, the National Society for Earthquake Technology-Nepal (Nepal)
- Center for Public Safety Research, Tsinghua University (P.R.China)
- Protective Technology Research Centre, Nanyang Technological University (Singapore)
- Department of Civil Engineering, National University of Singapore (Singapore)
- Sirindhorn International Institute of Technology, Thammasat University (Thailand)
- Asian Institute of Technology (Thailand)

## Global Networks

### BNUS (Bangladesh)



Distribution of research institutes with which ICUS has exchanged MOUs.

### Projects

- Assessment report on existing building vulnerability evaluation for mlss quarter, BUET
- Seismic risk assessment of some historical mosques of Dhaka using non-destructive testing (NDT) methods
- Application of microtremor array for estimating shear wave velocity in Bangladesh
- Community under fire threat: an assessment of fire hazard vulnerability of ward 65 in Dhaka City
- Geophysical investigation at proposed ganges barrage site in Pangsha Rajbari and at Bangora gas plant site in Brahmanbaria
- Vibration measurement and NDT at a cement factory site
- Development of flood map of Dhaka City

### Workshops

- “Urban community volunteer training program” was held on 23<sup>rd</sup> -25<sup>th</sup> November, 2012, IEB (Institute of Engineers, Bangladesh), Ramna
- BNUS and ICUS jointly conducted a number of interviews with some officials of different organizations of Bangladesh from 9<sup>th</sup> -12<sup>th</sup> December 2012.
- Seminar on Current Trends in Earthquake Resistant Design of Structures, Dr. S. K. Ghosh, President, S. K. Ghosh Associates Inc., USA and an internationally reputed earthquake engineer made a presentation on Current Trends in Earthquake Resistant Design of Structures on 09<sup>th</sup> February 2013
- BNUS team attended Global Earthquake Model (GEM) South Asian expert meeting and GEM technical training Kathmandu, Nepal, 1<sup>st</sup> -3<sup>rd</sup> March 2013

### Publication

- BNUS annual report-2012

### RNUS (Thailand)



### Projects

- “5th International Joint Student Seminar on Civil Infrastructure” at Chulalongkorn University during August 20-21, 2012
- Organizing a special lecture series, Introduction to Adaptive Technologies in Disaster Management, at Yangon Technological University, Myanmar, during December 4<sup>th</sup>, 2012– March 16<sup>th</sup>, 2013
- Organizing annual party of IIS Alumni Thailand Chapter in Bangkok, Thailand on March 16<sup>th</sup>, 2013

### Workshops

- Field investigation on flood and poverty in Myanmar and Thailand
- Analyzing citizen’s and foreigners’ disaster information collection behavior during the 2011 Chao Phraya River flood in Thailand
- Developing disaster information dissemination system in agricultural and mountainous area in the northeastern part of Thailand
- Investigating transboundary impacts of hydropower development in the Mekong River basin

### Publication

- 5<sup>th</sup> Joint Student Seminar on Civil Infrastructure



# International Center for Urban Safety Engineering, Institute of Industrial Science, The University of Tokyo

BW603, 4-6-1 Komaba, Meguro-ku, Tokyo 153-8505, JAPAN

Tel: 03-5452-6472 Fax:03-5452-6476

E-mail: [icus@iis.u-tokyo.ac.jp](mailto:icus@iis.u-tokyo.ac.jp) <http://icus.iis.u-tokyo.ac.jp/>

## Staff Members

### Urban Safety and Disaster Mitigation Division

- Prof. Kimiro MEGURO (Professor / Director)
- Prof. Yasuyoshi ICHIHASHI (Visiting Professor)
- Dr. Takaaki KATO (Associate Professor)
- Dr. Miho OHARA (Associate Professor)
- Dr. Muneyoshi NUMADA (Research Associate)
- Dr. Shinya KONDO (Project Researcher)

### Social Infrastructure Management Division

- Prof. Hiroshi YOKOTA (Visiting Professor)
- Dr. Reiko KUWANO (Associate Professor)
- Dr. Kohei NAGAI (Associate Professor)

### Environment Informatics Division

- Prof. Haruo SAWADA (Professor)
- Dr. Akiyuki KAWASAKI (Project Associate Professor)
- Dr. Takahiro ENDO (Research Associate) - 2012, 9

### Office

- Ms. Eiko YOSHIMOTO (Secretary)
- Ms. Ikuyo FUJISHIRO (Secretary) 2012, 9- 2013,3

### Research Fellow

- Dr. Reiko AMANO
- Dr. Ema KATO
- Dr. Yoshitaka KATO
- Dr. Junichi SUSAKI
- Dr. Masahiro SETOJIMA
- Dr. Satoshi TSURUDA
- Prof. Ansary Mehedi Ahmed
- Prof. Hoang Hong
- Prof. Sudhir Misra
- Dr. Dutta Dushmanta
- Prof. Tan Kiang Hwee
- Prof. Worak Kanok-Nuklchai