ICUS Newsletter

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

SATREPS Myanmar: officially launched

By Kimiro Meguro
Director / Professor, ICUS
The University of Tokyo

We are pleased to announce that SATREPS entitled "Development of a comprehensive disaster resilience system and collaboration platform in Myanmar" is officially started from April 2015 for 5 years after the signing of two contracts between Myanmar and Japan: Collaborative Research Arrangement (CRA) and Record of Discussion (R/D) –see ICUS Newsletter Vol. 14-1 and 14-2 for progress and details. A signing ceremony of CRA was held at Yangon Technological University (YTU) on 10th March 2015, and CRA was successfully established as of the date between YTU and The University of Tokyo (UTokyo). I signed as a representative of ICUS, UTokyo (Figure1). R/D will be established on April 9th 2015, between the Department of Technology Promotion and Coordination (DTPC), Ministry of Science and Technology (MOST), and Japan International Cooperation Agency (JICA). We are grateful for cooperation from not only Myanmar but also relevant Japanese organizations involved in the project including JICA and Japan Science and Technology Agency (JST). We are now ready to tackle the issues in disaster risk reduction in Myanmar through the project.

In response to the official start of the project, an environment to conduct the joint research activities has been set up steadily. Three rooms in YTU, a project office and a RS & GIS laboratory including a server and a storage rooms will be prepared in a building which is estimated to be

Figure 1: Signing ceremony of CRA

completed by July 2015 supported by ODA (Figure 2). The RS & GIS room will be used to conduct lectures and hands-on trainings for not only YTU's graduate students but also for faculty members of YTU, engineers, and officers from national and local governments and relevant organizations. This is one of the project's outcomes that fosters human resources who can contribute to develop Myanmar especially in disaster risk reduction.

From now on, we will start gathering data and information to establish a database as a basis of the project outcome, especially in three categories (Figure 3). Details of the each research group's activities are as follows:

"Water and river environment" research group focuses on the Bago River basin and gathers hydrological, meteorological and topography data from relevant ministries and departments: Irrigation Department (ID), Ministry of Agriculture and Irrigation (MOAI), Department of Metrology and Hydrology (DMH), Ministry of Transport (MOT), and Directorate of Water Resources and Improvement of River Systems (DWIR), MOT. Meanwhile, unavailable data will be gathered from field observations and surveys; meteorological observation and water gauges are planned to be installed. Eventually the collected data will be accumulated into the Data Integration and Analysis System (DIAS) as an information infrastructure.

"Infrastructure, buildings, and topography" research group collects infrastructures' information from relevant ministries and departments: Department of Bridges (DOB). MOT, and Yangon City Development Committee (YCDC). Besides, the group inspects and monitors the deterioration of existing infrastructure and buildings. Eventually, appropriate techniques for sustainable infrastructure management in Myanmar will be proposed. The obtained data will be compiled into a database with other data including high-resolution satellite images, past disaster records, land use change, ground condition, etc.

Figure 2: Project office and appearance of the building

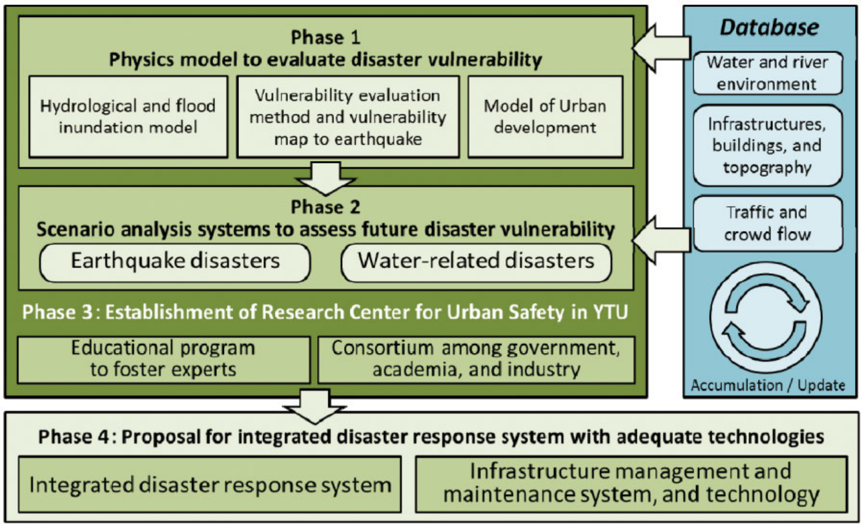


Figure 3: Research flow of the SATREPS project

"Traffic and crowd flow" research group attempts to analyze and determine real-time road traffic network and crowd flow in Yangon City associated with Myanmar Engineering Society (MES) and Ma Hta Tha, public transport regulatory body in Yangon. Necessary data, communication logs (Erlang data) and probe cars, will be collected from Myanmar Posts and Telecommunications (MPT), and mobile sensors, respectively. The gathering of probe car data will start with the installation of about 50 smart phones to public transportation, especially buses.

Other than the above mentioned group activities, we aim to establish a center tentatively named "Research Center for Urban Safety" at YTU. The center will have a function of an international platform to share and implement our research outcomes among government, academia and industry including Myanmar and Japan. Besides, as a part of the activities, we plan to conduct an annual international symposium to present outcomes of the project, joint research activities between YTU and UTokyo. In 2015, we plan to co-organize the symposium at YTU on 12th and 13th December in collaboration with YTU, MOST, and the other JICA Project "Enhancement of Engineering Higher Education in Myanmar (EEHE)". We will keep you updated about the progress of all SATREPS activities.

1st & 2nd SIP seminars held in Bangkok and Hanoi

By Dr. Koji Matsumoto

Infrastructure asset management is one of the research projects of the Cross-ministerial Strategic Innovation Promotion Program (SIP), which began in October 2014, steered by the Cabinet Office of the Japanese Government. ICUS participates in the SIP project of "Comprehensive research on development of road infrastructure management cycle and its application in Japan and abroad".

One of the most primary issues of the project is to implement Japanese technologies of infrastructure asset management in other countries, especially within the Asian region. However, it is not easy to export our technologies directly because each country has its own situation such as finantial and environmental problems. Thus, it is necessary to firstly understand the situation and the problems of each country. We need to consider how we should custamize our technologies according to the situation and problems.

Concequently, the 1st and 2nd SIP international seminars on infrastructure asset management were held in Bangkok and Hanoi on 11th and 17th March, 2015, respectively. As ICUS was one of the main organizers, its representatives participated in both seminars.

Presenters of the seminars were: two Japanese companies and three Thai government agencies in the 1st, and one Japanese company and one Vietnam government agency in the 2nd. Japanese and local universities in each country were also presented. The total number of participants were 139 and 142 in 1st and 2nd seminars, respectively. Majority of them were from government agencies and private companies (Fig.1)

Both seminars were successfully concluded with active exchange of information and opinions among participants. The 2nd one in Hanoi was broadcasted by local TV (HANOITV). It was reported that the seminar was meaningful for Vietnamese.

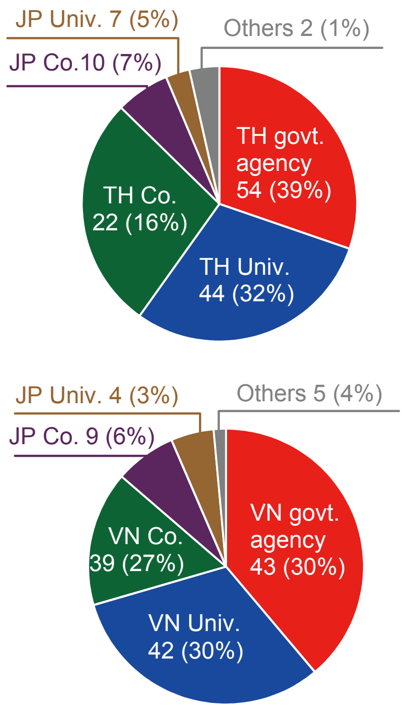


Figure 1: Breakdown of the participants' affiliation (top: Thailand, bottom: Vietnam)

Dr. Nagai, ICUS

Expressway Authority of Thailand

Audience

Snapshots of the 1st SIP seminar held in Bangkok, Thailand

Directorate for Roads of Vietnam

Audience

Dr. Nagai interviewed by HANOITV

Snapshots of the 2nd SIP seminar held in Hanoi, Vietnam

Poverty and Flood Survey in Myamar

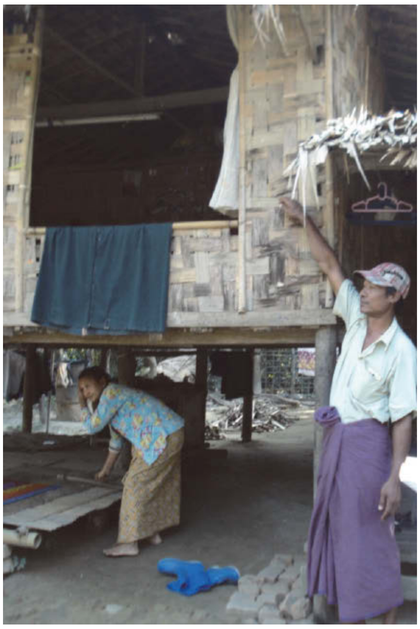
By Ms. Yukiko Tahira*

Myanmar is at a high risk from natural disasters, although it has high potential for economic growth, and rapid development is expected to occur in the near future. In the aftermath of Cyclone Nargis in 2008, the Myanmar Government began to estblish a new disaster management system, with relevant laws and regulations following international frameworks. However, the actual situation and damage at a community level has not yet to be revealed due to the lack of available data and statistics in the country.

In order to clarify details concerning the community-level flood management, we conducted a preliminary survey and inteviews with local residents in Bago township, Bago region in Myanmar between 1-4 Januray 2015, with the aim of collecting information on poverty and flood situation. An Asian Institute of Technology (AIT) Myanmar graduate student and I conducted the interviews using a questionaire regarding flood victims' household economic status, their damage, support they could receive, evacuation behavior and their coping strategy during the flood that occured 3 months prior to our visit.

In addition, we visited several ward offices and government istitutions, such as the Department of Meteorology and Hydropology (DMH) to iterview officials. The results of this survey will be published in an academic journal with comparative results with central Thailand.

*: Resional Network Office for Urban Safety (RNUS, AIT)



Flood came suddenly and reached at this level. There was no early warning before.

Interview with Indian Burmese family

Implementation Mechanism of Structural Assessments for Readymade Garments (RMG) Sectors

By Prof. Mehedi Ahmed Ansary

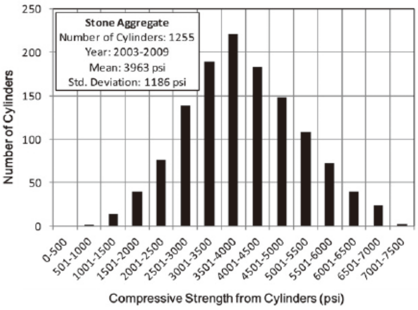
The common steps of structural assessment for RMG factories by team of expert are: visual inspection for identification of existence of any distress in building structures, review of structural design drawings and soil investigation reports to assess the current use and loading patterns (if available), and assessment of immediate threat of collapse.

Firstly, the columns for brick or stone aggregate concrete in the buildings were checked and recorded. In case of unknown column material, brick aggregate was assumed. For initial assessment of the column, equivalent concrete strengths for stone aggregate concrete and brick aggregate concrete were assumed 16.3 MPa (2,365 psi) and 14.1 MPa (2,045 psi), respectively. These two values were calculated by eq. (1) using the cylinder test results conducted at BUET Concrete Laboratory between 2003 and 2009 shown in Figure 1.

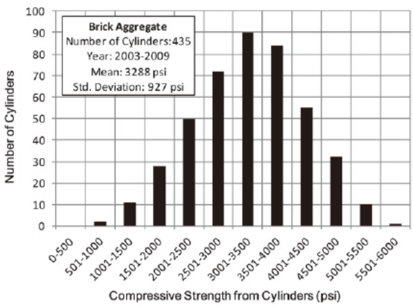
$$f_{ceq} = \text{Mean of the dataset} - 1.34 \times \text{Standard deviation of the data set} \quad (1)$$

Then the order of reinforcement is checked with a ferroscanner. In case of unknown number of reinforcement bar, it was assumed 1%.

For the assessment of immediate threat of collapse from current building use, the surveyors highlighted key columns and carried



(a) Cylinder test results for stone aggregate



(b) Cylinder test results for brick aggregate

Figure 1 Cylinder test results obtained by BUET between 2003 and *2009*

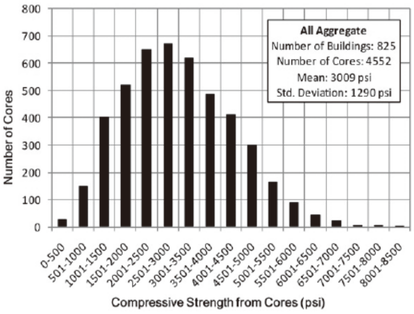


Figure 2: Core tests performed at BUET Laboratory between 2013 and 2015

out simple calculations of working stresses to find out Factor of Safety (FOS). FOS is Column Ultimate Strength (CUS) divided by the Column Working Stress (CWS), where CUS was calculated using eq. (2) according to BNBC (1993), and CWS were calculated comparing data set values and trigger points developed.

$$P_n = 0.8\phi\,[0.85 f_c\,(A_g - A_{st}) + f_y A_{st}] \quad \text{...} \quad (2)$$

where,

P_n = CUS

Φ = strength reduction factor (= 0.7)

f_c = compressive (cylinder) strength of concrete

A_g = gross area of concrete section

A_{st} = area of reinforcement

f_y = assume 40 ksi (276 MPa) for steel before 2005 and 60 ksi (414 MPa) for steel after 2005

Based on FOS, four color codes have been proposed to be used for indicating the required actions within certain time frame. If any factory is notified as hazardous after the assessment, the respective assessment teams inform the review panel of Bangladesh Government about the factories to carry on further assessment by inspection team and take final decision regarding the closure of the factory.

Requirement of Detailed Engineering Assessment (DEA) is decided based on FOS values of factory buildings. Other issues triggering DEA are: concerns with structural issues, i.e. extensions, lateral system, flat plate punching capacity and slender columns, and state of documentation and approvals. Core tests are essential actions for factory buildings falling under red, amber and yellow category to gradually improve the state of building and reach to green category. For the purpose of core test at least four, three-inch diameter core samples have to be collected and tested, and ACI 562 (2013) will be used to estimate equivalent concrete strength from those core data.

After each inspection, preliminary assessment reports are prepared including the findings along with required recommendations for the building owners and users according to the assessment results, i.e. DEA of the building involving soil investigation, other non-destructive tests and 3D building modeling.

Summary of Concrete Strength of RMG Factory Buildings

Starting from June 2013 until February 2015, 4,552 core samples of 825 factory buildings were collected and tested at BUET's Concrete Laboratory. Figure 2 shows distribution of these core test results. Out of these data, 2,673 are of brick aggregate with mean strength of 2,805 psi (19.3 MPa) and standard deviation of 1,231 psi (8.5 MPa), and 1,823 are of stone aggregate with mean strength of 3,312 psi (22.8 MPa) and standard deviation of 1,320 psi (9.1 MPa).

Figure 3 shows the distribution of construction year of the buildings along with their storey numbers from which core samples were tested at BUET. Out of these 825 factory buildings, 12,198, and the rest were built before 1980, between 1980 and 2000, and after 2010, respectively. Approximately, 52% of those factory buildings were constructed after 2005. Figure 4 shows representative of factory buildings by their construction year.

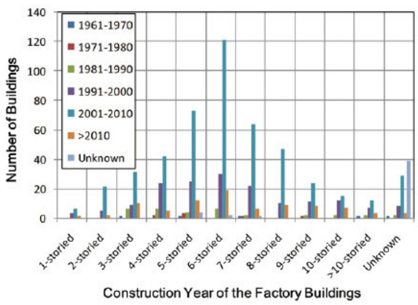


Figure 3: Year wise distribution of factories from which cores are collected

(a) Construction Year: 1984

(b) Construction Year: 1992

(c) Construction Year: 2002

(d) Construction Year: 2012

Figure 4: Representative of Factory Buildings by their Construction Year

Lessons from the 1995 Kobe Earthquake at Its 20th Anniversary

by Prof. Kimiro Meguro

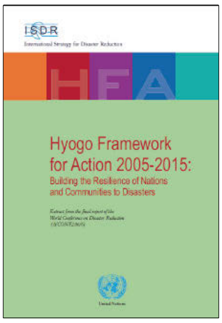
Twenty years have passed since the Kobe earthquake with Japan Metrological Agency (JMA) magnitude 7.3 struck middle-west part of Japan at 5:46 AM (Japanese local time) on the 17th January 1995 and caused severe damage. It was the first event that struck the modern big city in Japan and it recorded seismic intensity 7 of JMA scale which was the first time since the JMA defined seismic intensity 7 based on the damage due to the 1948 Fukui earthquake disaster.

Through the experiences of the Kobe earthquake disaster, many issues related not only to conventional earthquake engineering but also to general society were pointed out. Its impact was very strong and comparable to those by the 1891 Nobi earthquake, the 1923 Kanto earthquake, and the subsequent 2011 East-Japan earthquake.

Based on the Kobe earthquake disaster, we have changed many systems related to disaster management. We understood difficulty of earthquake prediction and put much weight on disaster countermeasures. World biggest shake table experimental facility called E-Defense for better understanding of dynamic failure behavior of full-scale structures by earthquake ground motion and strong-motion seismograph networks called K-NET and KiK-net were established by National Research Institute for Earth-Science and Disaster Prevention (NIED). Disaster Reduction and Human Renovation Institution, new disaster research institute, was established in Kobe City by the cooperation of Hyogo Prefecture and Cabinet Office of Japanese Government. Structural design philosophy was also changed. We started using two levels of seismic strong ground motions for aseismic design of structures, levels 1 and 2. Against the level 1 ground motion, which may happen once per structural life time, engineered structure should not be damaged and be operational. In case of level 2 ground motion that can be considered the maximum in the target region and whose probability is much lower than that of level 1 ground motion, once per hundreds of years, structure may have some damage but should not kill the people using the structure.

As over 1.4 million of volunteers in total visited the affected areas to support response and recovery activities, the NPO law was established in 1998. Besides this, many disaster related laws and regulations were revised.

After 10 years since the Kobe earthquake in 2005, the 2nd United Nations World Conference for Disaster Reduction (UNWCDR) was held in Kobe City, Hyogo Prefecture. And Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters shown in the figure below was declared. This will be reviewed during the 3rd UNWCDR which will be held in March 2015 in Sendai City, Miyagi Prefecture that is one of the most affected areas by the 2011 Great East-Japan earthquake.



Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters
Priorities for action 2005–2015

Drawing on the conclusions of the review of the Yokohama Strategy, and on the basis of deliberations at the World Conference on Disaster Reduction and especially the agreed expected outcome and strategic goals, the Conference has adopted the following five priorities for action:

1. **Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.**
   Countries that develop policy, legislative and institutional frameworks for disaster risk reduction and that are able to develop and track progress through specific and measurable indicators have greater capacity to manage risks and to achieve widespread consensus for, engagement in and compliance with disaster risk reduction measures across all sectors of society.
2. **Identify, assess and monitor disaster risks and enhance early warning.**
   The starting point for reducing disaster risk and for promoting a culture of disaster resilience lies in the knowledge of the hazards and the physical, social, economic and environmental vulnerabilities to disasters that most societies face, and of the ways in which hazards and vulnerabilities are changing in the short and long term, followed by action taken on the basis of that knowledge.
3. **Use knowledge, innovation and education to build a culture of safety and resilience at all levels.**
   Disasters can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities.
4. **Reduce the underlying risk factors.**
   Disaster risks related to changing social, economic, environmental conditions and land use, and the impact of hazards associated with geological events, weather, water, climate variability and climate change, are addressed in sector development planning and programmes as well as in post-disaster situations.
5. **Strengthen disaster preparedness for effective response at all levels**
   At times of disaster, impacts and losses can be substantially reduced if authorities, individuals and communities in hazard-prone areas are well prepared and ready to act and are equipped with the knowledge and capacities for effective disaster management.

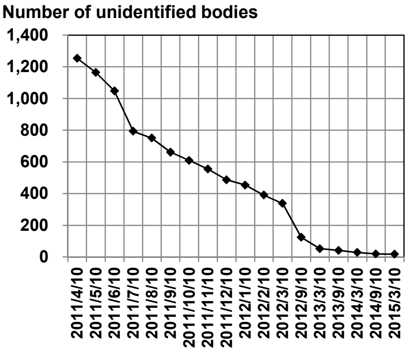
Lessons learnt from unidentified dead bodies for the effective operation in next huge disasters

By Dr. Muneyoshi Numada

Four years have passed since the 2011 Great-East Japan earthquake disaster. Still many unidentified dead bodies exist. The methods to identify the unidentified dead bodies are physical features and personal belongings for about 90%, shape of the tooth for less than 10%, finger print for 2% and DNA testing for one%.

In Miyagi Prefecture, Police Headquarters is still trying to identify the name, address and so on of 18 unidentified dead bodies at the end of March, 2015. As unidentified dead bodies were tried to be identified by physical features and personal belongings for the first time, but it was impossible to identify them. Their portraits were published to get the information of unidentified dead bodies from their families or relatives March 2012 after one year since the earthquake. The effect of portraits was found soon to identify some of the bodies.

But it was quite difficult to identify



Change in number of unidentified bead bodies

18 unidentified dead bodies. Because the DNA matching is difficult without information on family of unidentified dead bodies to identify the DNA type.

Also, as the way to identify them is mainly by the manual operation, long time is required to identify one body.

For effective responses of unidentified dead bodies for next disaster, following lessons learnt from the 2011 East-Japan Earthquake disaster should be considered:

1. Information sharing between police and local government: About 70,000 cases were asked to Miyagi Prefectural Police after the earthquake to check the safety of family or relatives. It was quite difficult to answer only by police from the limited information of the name or sex and so on.

2. Development of dental and DNA databases: The databases are necessary to identify the dead body smoothly. Although the police tried to identify unidentified dead bodies, it was inefficient due to a lack of data.

3. Management of personal belongings: After performing autopsy to identify the dead bodies, their belongings should be kept and managed properly.

4. Standard process of responses of autopsy at each autopsy venue. 26 points autopsy venues were set in Miyagi Prefecture at the peak. To keep same quality of operation, the standard operation and information sharing among the sites and the head quarter are necessary.

5. Wide area corresponding bodies processing: Tokyo metropolitan received some dead bodies from Ishinomaki City. For the next huge disasters, effective wide area dead body treatment is necessary.

6. Preparation of temporary mortuary and autopsy venue: Schools or public buildings were used for temporary mortuary and autopsy.

ICUS Activities January- March

Titles of graduated students

Lab.	Name	Grade	Title
Meguro	Dar Adnan Mahmood	Master	Experimental study on reduction of PP-band Mesh connectivity for effective seismic retrofitting of brick masonry house
	Nao Sasaki	Master	Effects of Location of Welfare Facilities on the Support for Vulnerable People in Disaster
	Jyo Inaba	Master	A Fundamental Study on Estimation of Workloads and Duration of Disaster Response Activities by Municipalities
	Keitaro Tanaka	Master	Impact Analysis of Infrastructure Rearrangement in Tsunami Affected Area Considering the Depopulation on Sustainable Management Initial Cost Reduction and Running Cost Reduction of Infrastructure -Case Study on Fishing Port and Fishing Village-
	Ayaka Nishiguchi	Master	Accuracy of Seismic Intensity Estimation of the JMA Earthquake Early Warning System and the New Criteria of Warning
	Yuki Murakami	Master	Verification and validation of the effects of self-floating evacuation facility usable in both normal and emergency situations
Kuwano	Abilash Pokhrel	Master	Development of Large Size Disk Transducer to Evaluate Elastic Properties of Coarse Granular
	Nguyen Ngoc Duyen	Master	The Effect of Partly Loosened Backfill to the Behavior of Buried Flexible Pipe
Oki	Shinjiro Yano	Doctor	Assessment of environmental impacts on freshwater availability and sustainability of human activities
	Nobuyuki Utsumi	Doctor	Characteristics of global precipitation for different weather systems and the impacts of climate change
	Natsuki Yoshida	Master	Study on the impacts of uncertainties in global land surface parameters on the water budget estimation
	Akane Sanae	Master	Investigation on formation of the hotspot and uncertainty analysis of radioactive material transport simulation in the atmosphere
	Misako Hatono	Master	Implementation and impact assessment of inundation processes in a climate model
	Wataru Suzuki	Master	An objective estimation method to create precise land cover data in a wide area
	Junya Hamada	Master	A Discourse on Dams: Understanding and Elucidating the Factors of Dam Removal in Japan
Kato (T)	Sae Shikita	Master	Construction of a measurement method of motivation degree of an individual resident as a player in community planning and demonstration of its effectiveness
	Shoko Kudo	Master	Development of Road Inaccessibility Risk Assessment Model Which Includes Road Cave-ins on Large-Scale Earthquakes and Its Application in Chigasaki City, Kanagawa
	Tasuku Yoshioka	Master	Looking at the Future Scope for Enhancing Disaster Prevention Planning Activities through the Perspective of Growth hacking Analogy
Iryo	Ai Nagashima	Master	A Study on the Quality of Service of Pedestrian Crossing Flow

Travel

Date	Name	Country	City	Category	Purpose
Jan. 2-7	Prof. Meguro	Nepal	Kathmandu	Lecture	Support of JSPS program
Jan. 11-13	Prof. Oki	India	Gandhinagar	Conference	Water Security, Climate Change and Sustainable Development
Jan. 19-24	Prof. Oki	Switzerland	Bern	Conference	ISOT/TC207/SC5/WG8
Feb. 9-13	Dr. Matsumoto	Finland	Helsinki	Conference	IABSE2015
Feb. 22- 26	Dr. Nagai & Dr. Matsumoto	India	Hyderabad, Delhi	Workshop	SIP project
Mar 3-8	Dr. Numada	Indonesia	Jakarta, Padang	Workshop	JICA project
Mar. 14-Apr. 4	Dr. Numada	Indonesia	Jakarta, Padang	Workshop	JICA project
Mar. 15-18	Dr. Nagai & Dr. Matsumoto	Vietnam	Hanoi	Workshop	SIP project
Mar. 26-Apr. 1	Mr. Kodaka	Myanmar	Yangon	Meeting	JICA-JST SATREPS project

Editor's note...

On the articles of this volume of the Newsletter, we are pleased to announce the official start of two big projects for ICUS; one is SATREPS and the other is SIP. In both of projects, we will try to implement Japanese technologies in other Asian countries and collaborate with local researchers or engineers for the above purpose. We believe that ICUS's wide spread network and a variety of our research field lead us to the success of these projects.

It could be said that the most important aspect for collaboration is mutual interaction of different knowledge. Generally, this "chemical reaction" of multiple intelligence will be a great power to output creative ideas. In my research area, such mechanisms are formulated by mathematical model, and called "spatial interaction model". As main findings from the mathematical model, "to shorten the distance" and "to enhance the attractiveness" are essential for greater interaction (please imagine the law of universal gravitation). Today, our real world becomes enough "small" by the developments of transportation techniques and internet networks. Hence, we must put forth an effort to output the valuable research results as a pioneer of sustainable society. Developing the positive feedback of collaboration and output is a dominant mission of ICUS.

We decided to organize "15th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia (USMCA 2015)" in Kathmandu, Nepal from 29th to 31th October 2015. 2015 Nepal earthquake caused serious damages to the nation. We have a plan of special session about the "disaster recovery strategy for future Nepal". This face-to-face conference will shorten the mental distance between Japan and Nepal, and produce the new collaborative activity which is also a great challenge for ICUS.

USMCA 2015: Oct. 29−31, Kathmandu, Nepal

The 14th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia (USMCA 2015) will be held in Kathmandu, Nepal on **October 29-31, 2015**. Further information is available at the USMCA 2015 official

Website: http://www.nset.org.np/USMCA2015

International Center for Urban Safety Engineering (ICUS)
Institute of Industrial Science, The University of Tokyo
4-6-1 Komaba, Meguro-ku, Tokyo 153-8505, Japan
Tel: (+81-3) 5452-6472, Fax: (+81-3) 5452-6476
http://icus.iis.u-tokyo.ac.jp

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