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

RAPID URBANIZATION AND URBAN SAFETY ISSUES AMID MINING BOOM: A CASE IN MONGOLIA

By Yasuyoshi Ichihashi
Visiting Professor, International Center for Urban Safety Engineering
Institute of Industrial Science, The University of Tokyo

This year's USMCA was held in Ulaanbaatar, the capital city of Mongolia (see article on p.4). One of the particular features of this year's symposium was that there were many Mongolian participants, most of whom discussed urban safety issues in Mongolia, particularly in Ulaanbaatar.

This short article briefly sums up main discussions of the issues in Mongolia, adding some historical and geopolitical backgrounds, and attempts to make some suggestions for possible solutions in the future.

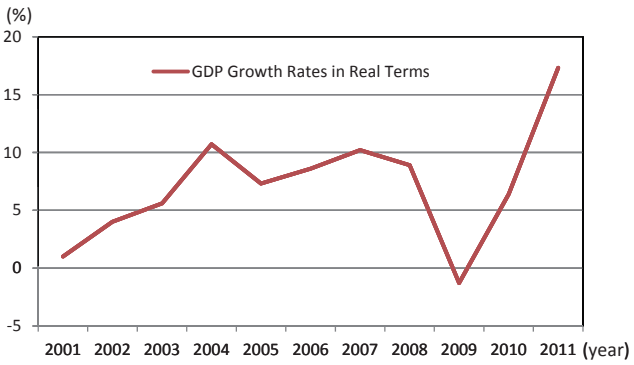
Fast economic growth

The economic progress in Mongolia in the recent years has been remarkable. Its most powerful driving force has been the greatly heightened international attention on mineral resources development such as coal, copper, gold, rare metals or uranium, and the increased in-flow of foreign capital into the mining sector. It is also pointed out that the recent rapid growth in Chinese economy has stirred up demand for these resources.

Mongolia has taken steady steps towards democratization since the early 1990s, with Japan and other major donors have been rendering assistances. Throughout

View of Ulaanbaatar City: Population of the city became appreciably five times during last thirty years.

Yaer	2001	2002	2003	2004	2005	2006
GDP Growth Rates in Real Term	1.0%	4.0%	5.6%	10.7%	7.3%	8.6%
Yaer	2007	2008	2009	2010	2011	
GDP Growth Rates in Real Term	10.2%	8.9%	−1.3%	6.4%	17.3%	



GDP Growth Rates in Real Terms

this process, Mongolia has created necessary investment environment, including legal instruments, institutional set-ups, and human resources development, although still not perfect.

Growth rates of the Mongolian economy are shown in the table and figure above. In parallel with this, population has been migrating to the capital city. as shown in the table and figure below.

Rapid urbanization

Historically for a very long time, Mongolians are nomads with virtually no experiences in market economy. During the socialist times, industrialization evolved to a certain extent -- light industrial product factories built, capital city constructed, and policies such as collectivization of nomads promoted. In 1990, nevertheless, 60 to 70% of the whole population still lived nomadic lives, and population in the capital city remained as small as about 500 thousand. In other words, Mongolia has not faced real serious urban safety issues to date.

Due to the price hike of the natural resources since around 2004, Mongolia experienced trade surplus as well as fiscal surplus for the first time ever in the country's history. Export of copper to China was the main cause. Thereafter, mining boom arose in Mongolia, followed by construction rush in Ulaanbaatar, including high-rise buildings.

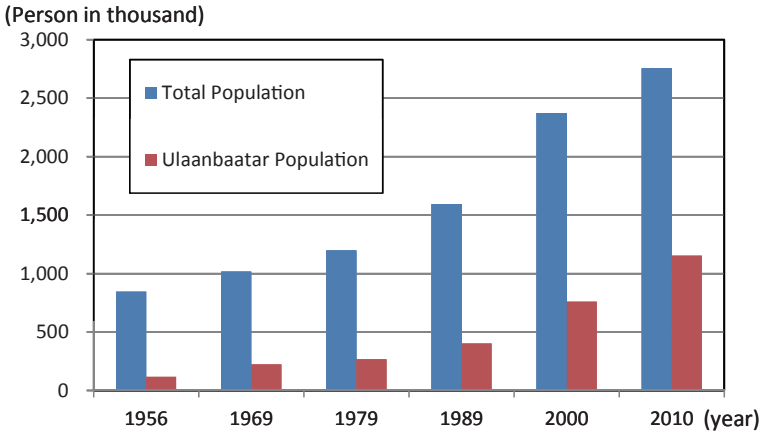
Such "bubbles" came to an end around 2008 to 09. After the Lehman shock, copper price fell down due to a temporary recession in China, with Mongolia also experiencing economic crisis in 2009. Thanks to the assistance given by international donors including Japan, and to comparatively rapid recovery of the Chinese economy, Mongolia managed to overcome the crisis. In October 2009, the long-awaited development contract with Canadian and British-Australian companies on South-Gobi copper and gold mine was concluded, and then Mongolia came back to the growth path. In 2011, growth rate recorded as high as 17.5%.

Dangers of rapid growth

Such process of economic development, on the other hand, brought large strains associated with

(in thousand)

	1956	1969	1979	1989	2000	2010
Total Population	845.5	1017.1	1197.6	1595.0	2373.5	2754.7
Ulaanbaatar Population	118.4	223.7	267.4	402.3	760.1	1154.3
% of capital pop. In total	14.0	22.0	22.3	25.2	32.1	41.9



Population in Mongolia & Ulaanbaatar. 1956-2010

rapid urbanization. Discrepancy widened between the arising new rich and middle class, who can enjoy the fruits of the mining industry development, and low-income strata who migrates to the capital from countryside. Urban population concentration, gaps between urban and rural sectors as well as gaps inside urban area are commonly observed in many Asian countries, and Mongolia is of no exception. Travelers to Ulaanbaatar will easily see what is called the "ger" area, -- areas where people live in nomad's tents, with no proper electricity, water supply, or sewage installation.

Infrastructure building did not catch up with the pace of rapid population concentration to the capital. Air pollution due to inappropriate coal burning during the winter season in the "ger" area, insufficient water supply and sewage system, degraded river and underwater quality due to factory effluent, are deteriorating living conditions in the capital. Insufficient primary and secondary school classrooms, as well as deterioration of health and medical service quality, are also salient. Increased number of vehicles makes roads always congested.

Future city risks

At the symposium, and also at the general assembly of the Asian Seismological Commission, held also in Ulaanbaatar prior to the symposium, Mongolian seismologists discussed possibilities of a magnitude 7 level earthquake around Ulaanbaatar, as well as great risks involved thereby of collapse of many buildings in the city. Not only the old buildings and infrastructures, built during the socialist times are risky, but also those new buildings completed in the recent years are facing risks of collapse because many of them were constructed in accordance with the old building code introduced from the Soviet Union in the socialist years.

There are also newly built "illegal" buildings, which don't even follow the building code. If any big earthquake should strike at all, particularly during the severe winter season, hot water supply through the collective heating system may stop, emergency food and water supply may become short, transportation and communication system may be paralyzed, and so forth. Huge urban safety risks are to be faced.

Countermeasures against earthquake disasters

The Mongolian government has been taking steps, in cooperation with JICA and others, to incorporate disaster prevention/mitigation aspect into the capital city's master planning, to draw up hazard map on the basis of damage estimation, and introducing "passporting system" to judge possible damage to individual buildings, and so on. But all these actions have started only recently, and much has yet to be done.

In the future, further development of mineral resources is being planned, which is likely to trigger further population expansion in the capital. Ulaanbaatar has already become a "mega city" for a nation like Mongolia, though not exactly in the terminology of a global standard. Urban safety and disaster prevention measures became increasingly important for policy planners as well as capital city residents. Efforts in this area by Mongolia at every stratum of the society, and international cooperation to such efforts are also of growing importance.

Japan, having long experiences of natural disasters, can provide knowledge and technologies, and is regarded as one of the best partners in this field. Bilateral programs agreed upon at the Mongolian President's visit to Japan in 2010 also clearly indicated this. It is indeed hoped that, taking the opportunity of the USMCA 2012, academic/research level cooperation would be enhanced further.

Suggestions for Mongolia

General observations and recommendations for future solutions, obtained from the participants of the symposium, are summarized in the following five points, and have been conveyed to the Mongolian authorities by Professor Kimiro Meguro.

[Recommendations for the future]

(1) Conversion from polarization model (concentration to Ulaanbaatar) to dispersion model in urbanization.
(2) Improvement in urban road network and grade-up of its maintenance/repair work.
(3) Urban planning in consideration of fault locations, ground foundation structure conditions, geomorphological conditions, etc.
(4) Improvement in water resources management
(5) Establishment of urban safety/ disaster information/enlightenment center in Ulaanbaatar.

USMCA 2012 held in Ulaanbaatar, Mongolia

By Y. Ichihashi

The 11th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia (USMCA 2012) was held from October 10 to 12 in Ulaanbaatar, Mongolia. USMCA 2012 was jointly organized by ICUS, the Mayor of Ulaanbaatar City, and Mongolian University of Science and Technology (MUST), with support from the President of Mongolia. The two-day symposium program included 5 keynote speakers, a poster session with 27 poster presentations, and 10 parallel sessions with 57 oral presentations. A total of 149 people, including both speakers and audience representing 14 countries, joined this year's symposium,.

Inauguration of the symposium was chaired by Mr. D. Battulga, Speaker of the Ulaanbaatar City Parliament, and the message from the President of Mongolia was read out by Mr. P. Tsagaan, the Head of the Office of the President. Opening speeches were delivered by Mr. E. Bat-Uul, the Mayor of Ulaanbaatar City, Mr. T. Shimizu, the Ambassador of Japan to Mongolia, and Dr. K. Meguro, Director and Professor of ICUS. Keynote speakers included Prof. B. Damdinsuren, President of Mongolian University of Science and Technology, Dr. Y. Yasuoka, Center for Research and Development Strategy, Japan Science and Technology Agency, Mr. Y. Ichihashi, ICUS visiting professor, Dr. S. Demberel, Research Center for Astronomy and Geophysics, Mongolian Academy of Science, and Dr. T. Uomoto, Chief Executive of Public Work Research Institute, Japan.

Following last year's modality, this year's symposium also featured a poster presentation session. Posters covering a variety of topics were on display, and many participants joined the presenters in lively discussions.

Oral presentations were given in 10 parallel sessions which covered topics including: risk assessment, disaster response and recovery, planning and development of urban infrastructure systems, development and application of sustainable technologies, urban flood risk management in changing climate, and application of geospatial technologies.

At the end of the symposium, the Excellent Young Researcher Award – prepared by ICUS to encourage the activities of young researchers – was presented by Dr. U. Sukhbaatar.

On the third day of the symposium, a field trip around Ulaanbaatar was held. The tour visited Sun Road (8.4km road renovation project by Japanese ODA), Sun Bridge (895m bridge and approach road construction project by Japanese ODA), and thermal power plant No.4 (assisted by grant and loan programs of Japanese ODA).

USMCA 2013 will be held in Hanoi, Vietnam, from October 9 to 11, 2013. Please check the ICUS website for future updates and announcements.

The winners of the Excellent Young Researcher Award at USMCA 2012

Poster presentation award:

Dr. N. H. Giang, National University of Civil Engineering University, Vietnam: *"Sliding disaster in Vietnam and a new proposed design method of reinforced soil wall"*

Ms. X. Xu, The University of Tokyo, Japan: *"Vulnerability assessment of snow disaster based on traffic system: A case study of Chenzhou City in Hunan, China"*

Oral presentation award:

Dr. M. W. Henry, Hokkaido University, Japan: *"Disaster information collection by Thai and foreigners during the 2011 Thai flood"*

Mr. K. Ikuta, The University of Tokyo, Japan: *"An analytical investigation of applicability of mechanical anchorage system to beam-column joint by 3D discrete model"*

USMCA 2012 participants in fron of Parliamanet House of Mongolia

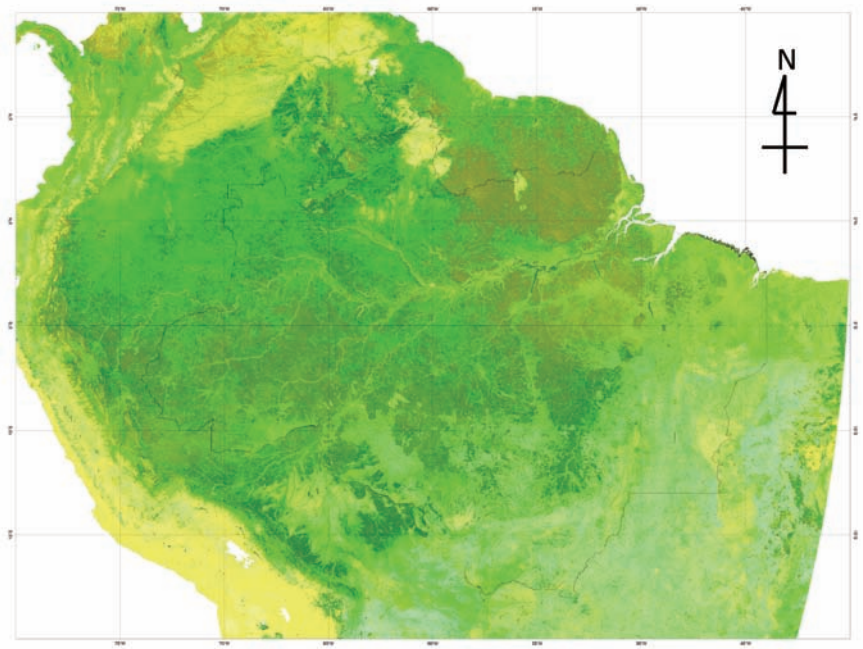
Open Seminar "Amazon Forest from Space"

By H. Sawada

Prof. Haruo Sawada, ICUS, and his colleagues organized the open seminar "Observation of Amazon Forest from Space" on 17 October, 2012. This seminar focused on the research project of the Carbon Dynamics in Amazon Forest (CADAF), supported by JST/JICA, Science and Technology Research Partnership for Sustainable Development.

Greenhouse gas emission from deforestation was recognized as one of the key issues at the "COP13 of United Nations Framework Conservation on Climate Change (UNFCCC)" in 2007. Amazon forest stores the world's largest amount of carbon, thus deforestation of Amazon forest has become one of the prime global issues.

Under these situations, a four-year project (2010-2013) was launched, with the aim to develop an evaluation technique on a large-scale carbon dynamics of Brazilian Amazon forests. The leading group is composed of: Forestry and Forest Products Research Institute (FFPRI, Japan), the University of Tokyo (UT, Japan), National Research Institute of Amazon (INPA, Brazil) and National Research Institute of Space (INPE, Brazil). Prof. Sawada conducts the remote sensing study "Mapping of Carbon Dynamics in Amazon Forest", collaborating with INPA and INPE. The remote sensing group mainly works on the following subjects: diversity of site environment in Amazon, forest structural parameters on remote sensing data and mapping of forest biomass distribution in Amazon. The midterm evaluation of the research was successfully ranked in the project in August 2012, although some delays were caused due to flight permission.



Forest Cover Map derived from MODIS satellite

One keynote speech and four reports were presented at the seminar. The guest keynote speaker, Dr. Yosio E. Shimabukuro, Principal Researcher of the National Research Institute of Space (INPE), introduced their deforestation monitoring system, Programa Despoluição de Bacias Hidrográficas and Detecção de Desmatamento em Tempo Real, in the Amazon. PRODES uses Landsat data for detecting deforested area in a year and updating forest distribution map. DETER is used to detect deforestation activities in a short period of time using Moderate Resolution Imaging Spectroradiometer data (250m ground resolution).

Dr. Moriyoshi Ishizuka, Forestry and Forest Products Research Institute (FFPRI), summarized the progress of the CADAF project.

Dr. Renpei Suwa, FFPRI, showed the achievement of field data analysis.

Dr. Egidio Arai, INPE, focused on the recent remote sensing technology for forest monitoring.

Mr. Yoshito Sawada, IIS, emphasized the role of MODIS satellite for monitoring natural environment in global scale. Prof. Sawada concluded the seminar, focusing on carbon stock estimation of the whole Amazon forest, and explained about the integration of various kinds of information.

About 60 participants keenly listened and asked many questions on research technologies and recent situations of the Amazon forest.

Keynote speakers, Dr. Suwa, FFPRI and Dr. Shimabukuro, INPE

RNUS: Starting collaboration with YTU, Myanmar

By A. Kawasaki

Responding to the upcoming rapid development of economy and society in Myanmar, RNUS is exploring the possibility of research collaboration with Yangon Technological University (YTU), the most historic engineering school in the country. After the first meeting at YTU in September, 2012 and the continuous discussions in the following months, we have reached an agreement to offer a special lecture series at YTU, titled "Introduction to Adaptive Technologies in Disaster Management". The series covers geospatial technologies (i.e. GIS and remote sensing), disaster management, infrastructure management (i.e. geotechnical and geoenvironmental engineering), and concrete material and structure. These emerging technologies must to be covered by graduate students in civil engineering and archtecture/ urban planning course so as to prepare for the coming rapid land and infrastructure development in Myanmar. However, YTU had lacked human resources to teach these subjects. Eight faculties from IIS, mainly from ICUS, have decided to offer continuous lectures at YTU within a whole semester from December 2012 to March 2013. In addition, joint research for further collaboration in disaster and infrastructure management in Yangon is being planned.

YTU campus

Lecture by Prof. Sawada

Feasibility study on disaster information dissemination system at Bangladesh with BNUS

By S. Kondo, A. Kawasaki and M. Ohara

Our research group tries to develop a disaster information dissemination system in rural and agricultural areas where support from the national and local governments cannot be expected.

This time, we conducted a field survey with BNUS members on current disaster information dissemination in the rural areas of Bangladesh. In December, Drs. Kawasaki and Kondo with two students visited Dhaka and Manikganj on the west side of Dhaka.

In Dhaka, we conducted interviews with some national institutions. We found that disaster management system for cyclone is different from that of flood disaster in terms of, for example, the organization responsible and involvement of volunteers.

Several methods for information transmission to citizens using mobile phones have been developed in Bangladesh. People contact information center to get voice information, transmitting information directly to the person in charge by SMS, and transmitting short messages directly to mobile phones around base stations.

Although people of the surveyed village live without electricity, they use mobile phones. They charge their phones from solar panels. Since literacy rate of the villagers is low, there is a limit to disseminate disaster information by text. “So one of a Public Trust, CEGIS (Center for Environmental and Geographic Information Services) has developed a flag system to imform the change in the river level upstream without text.”

We will continue with our research activities, and hope to propose a system as we follow the trends of mobile phones.

Interview at CEGIS

Field survey at Manikganj

The First ACF Technical Board / Technical Committees Meeting

By K. Nagai

Asian Concrete Federation (ACF) held the First ACF Technical Board /Technical Committees Meeting in Pattaya, Thailand, on October 26, 2012.

One of the aims of the committee is to propose the design code of reinforced concrete, Asian Concrete Model Code (ACMC), in the Asian region. The committee has taken over the activities of International Committee on Concrete Model Code for Asia (ICCMC), which was established in 1994 and merged with ACF in 2010. The Chairman is Dr. T. Uomoto, former director of ICUS and presently Chief Executive of Public Works Research Institute. Prof. Yokota, Visiting Professor, and Associate Prof. Nagai, both from ICUS, also joined the meeting as committee members.

Technical Board Meeting (photo by ACF)

The three technical committees that constitute the board cover the majority of concrete material and structure fields as follows:

TC1: Design

TC2: Materials and Construction

TC3: Maintenance

The discussion featured proposed design codes, mainly based on the country code, Japanese, Thailand and Vietnamese codes. They will be arranged to fit the concept of the ACMC and published after approval processes are completed.

ICUS Activities (Travel and Award) October – December

Travel

Date	Name	Country	City	Category	Purpose
Sept.30-Oct.7	Dr. Kawasaki	Thailand	Bangkok		Operation of RNUS & lecture
Oct.7-12	All ICUS staff	Mongolia	Ulaanbaatar	Symposium	USMCA2013
Oct.13-31	Dr. Kawasaki	Thailand	Bangkok		Operation of RNUS & lecture
Oct.23-28	Dr, Nagai	Thailand	Bangkok	Investigation	AUN/SEED-Net Program
Nov.3-10	Prof. Sawada	Brazil	Iraty Curitiba Foz do Iguacu	Seminar Investigation Lecture	Carbon Dynamics of Amazonian Forest
Nov.7-Dec.25	Dr. Kawasaki	Thailand	Bangkok		Operation of RNUS & lecture
Nov.12-18	Prof. Sawada	Cambodia		Workshop	Mekong River Basin
Nov.12-15	Dr. Kawasaki	Myanmar	Yangon Taunggyi	Visit Investigation	Yangon Technological University Lake Inlay
Nov.13-15	Prof. Meguro	Korea	Cheju	Symposium	Computational Design in Engineering (CODE2012)
Nov.16-19	Dr. Numada	China	HongKong	Conference	2nd International Conference on Civil Engineering and Building Materials (CEBM2012)
Nov. 24-Dec.8	Prof. Sawada	Myanmar	Yangon	Lecture	Yangon Technological University
Nov.25-28	Dr. Kawasaki	Philippines	Manila	Visit	World Bank
Dec.3-4	Dr. Nagai	China	HongKong	Symposium	4th Asia-Pacific Young Researchers & Graduates Symposium
Dec.5-7	Dr. Nagai	Singapore		Workshop	4th IPA International Workshop
Dec.5-12	Dr. Kawasaki & Dr. Kondo	Thailand & Bangladesh	Loei, Dhaka, Manikganj	Hearing	Disaster information dissemination system
Dec.17-20	Dr. Kawasaki	Myanmar	Yangon	Lecture	Yangon Technological University

Award

Date	Name	Award	Organization
Oct.11	Ms. X.Xu (Kato Lab.)	Poster Presentation Award for Young-Researcher	USMCA2013
Nov.3	Ms. Yasmin Bhattacharya (Kato Lab.)	Best Poster Presentation Award	The 31st Institute of Social Safety Science
Dec.4	Dr. Nagai	Best Paper Award	The 4th Asia-Pacific Young Researchers & Graduates Symposium
Dec.7	Dr. Nagai	4th IPA Research Grand Award	International Press-in Association
Dec.7	Mr. Saleem M. Umair (Meguro Lab.)	Excellent Paper Award for Young Researchers	The 1st International Symposium on Earthquake Engineering

Editor's note...

It was the first USMCA symposium to be held in a parliament house. We are truly grateful to the Mongolian government for allowing us to take part in such a memorable occasion. I believe it to be a sign of Mongolia's high expectations towards the symposium on urban safety management.

My last visit to Mongolia was about fifteen years ago. It was for the purpose of conducting field survey after the big forest fire in 1996. When I visited Mongolia this October, I felt that everything had changed so much and that I cannot compare my past memories with the city as it is today, particularly the Ger area. We certainly hope that the outcome of the USMCA symposium will lead to positive effects in the sustainable development of Ulaanbaatar city.

It is fantastic that the series of lectures by ICUS professors have started at Yangon Technological University (YTU) in Myanmar. When I visited YTU three years ago, there was no sound in the campus. However, when I visited YTU as the first professor of the lecture series in last December, the place was filled with happy voices of young students. Both YTU and Mandalay Technological University are very much interested in human development through their education programs for engineers.

Both Mongolia and Myanmar are developing extremely fast. Appropriate safety management should be introduced for the healthy growth of cities. We do hope and will be more than glad to continue and strengthen the relations with these countries.

By H. Sawada

USMCA 2013: Oct 9-11 in Hanoi, Vietnam

The 12th International Symposium on New Technologies for Urban Safety of Mega Cities in Asia (USMCA 2013) will be held in Hanoi, Vietnam on **October 9-11, 2013**.

Deadlines: Abstract June 15, 2013
Full Paper Sept. 1, 2013

Further information is available at the USMCA 2013 official website: **http://www.usmca2013.vn/**

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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