国総研ニューズレター
NILIM News Letter
No.53
Summer 2015

■ Results of activities by the NEPAL reconstruction support and survey team

Urban Planning Department

To reconstruct Nepal after the earthquake disaster, experts from the NILIM and other institutes have supported the provision of earthquake-proof post-disaster housing and the enactment of a master plan for resilience of the urban region of the City of Kathmandu.

To reconstruct Nepal after the earthquake disaster of April 25, 2015, four experts—Mr. Hiroshi Kaneko, Director of the Urban Planning Department, and Mr. Hiroyasu Shingai, Head of the Urban Facilities Division from the NILIM, Dr. Shigeki Unjoh, Research Coordinator for Earthquake Engineering from the Public Works Research Institute, and Dr. Tomohisa Mukai, Senior Researcher from the Building Research Institute—conducted varied support activities for about 2 months as members of the Japan International Cooperation Agency (JICA) Nepal Reconstruction Support and Survey Team.

This dispatch is particularly noteworthy, because the experts incorporated the concept, "Build Back Better," which is premised on predicted earthquakes and is one of the priorities for action of the Sendai Framework for Disaster Risk Reduction 2015-2030 that was adopted at the Third United Nations World Conference on Disaster Risk Reduction held in Sendai in March this year, is the first international cooperation effort incorporating this concept, and is an important effort by Japan to apply its experience in disaster reconstruction.

This earthquake severely damaged weak masonry homes made of rocks and bricks connected by mud mortar. Rebuilding about 600,000 such homes is an urgent challenge. The experts proposed models of earthquake-proof post-disaster homes that can be realized considering the housing situation, building materials, and work methods in Nepal, and performed a demonstration construction of these model homes.

On the other hand, they also saw cases of story –collapse and out-of-plane failure of brick walls of RC confined masonry buildings, so they proposed the provision of standards for member and building levels based on material levels regarding seismic standards for buildings at the same time as they introduced seismic resistance diagnosis and seismic resistance improvement technologies for similar buildings.

Photo: Damage Survey by the support and survey team

Photo: (from front left), Dr. Narayan Khadka , Minister of Urban Development of Nepal, Mr. Minoru Kiuchi, Vice-Minister for Foreign Affairs, and Dr. Akihiko Tanaka, JICA President are given an explanation at the earthquake-proof post-disaster housing construction demonstration.

And to prepare for an even larger earthquake, in addition to building a wide-area infrastructure network for the urban region of Kathmandu, where the population is expected to increase rapidly, they began the process of enacting a master plan for strengthening including urban disaster prevention countermeasures for high-density downtown neighborhoods or systematic urban development in suburbs.

They also performed seismic inspections of road infrastructure including more than 30 bridges in the Kathmandu urban region, selected and proposed challenges that should be reflected in the enactment of the master plan for strengthening, and at the same time, proposed strengthening systems to develop, accumulate, and disseminate design, construction, and maintenance technologies, and the provision of Nepal's own bridge standards.

In the future, these achievements are expected to contribute to the realization of the reconstruction of Nepal through the reconstruction and seismic diagnosis of public facilities and the construction of earthquake-proof post-disaster housing made possible by JICA development planning studies conducted to assess risk of predicted earthquakes and enact master plans for urban transportation based on the needs of Nepal, support for technical assistance with JICA emergency development surveys conducted to enact the master plan for resilience of the City of Kathmandu region and through financial assistance.

■ Situation investigation of the areas affected by volcanic ash via helicopter on Kuchinoerabu island.

Sabo Department, Sabo Risk-Management Division

On Kuchinoerabu Island (Kagoshima Prefecture), scene of an explosive volcanic eruption, in response to a request by the Kyushu Regional Development Bureau, a helicopter investigation was conducted, clarifying the state of movement of sediment after the ash fall.

Mt. Shindake on Kuchinoerabu Island (Kagoshima Prefecture) erupted explosively on May 29, 2015, sending smoke billowing to a height of more than 9000m in the sky above the crater's rim. The eruption was accompanied by a pyroclastic flow that reached the ocean to the north-west of Mt. Shindake (Mukaehama Beach). The Meteorological Agency responded to the eruption by raising

Photo: Mukaehama River (Kuchinoerabu Island Kagoshima Prefecture)
Provided by the Kyushu Regional Development Bureau

the volcanic eruption alert level from 3 (restricting access to the mountain) to 5 (evacuation), and the town of Yakushimacho issued an evacuation order to all residents of the island.

Torrents affected by the fall of ash are at risk of debris flows caused even by relatively light rainfall, so in response to a request by the Kyushu Regional Development Bureau, on June 4, a helicopter conducted a survey to clarify the movement of sediment.

The day before the survey (June 3), rain with maximum hourly rainfall of 38mm and cumulative rainfall of 72mm was observed (Kagoshima Prefecture, Kuchinoerabu Rainfall Station), but it was confirmed that this rainfall triggered a debris flow in the Mukaehama River, where, it is assumed, a pyroclastic flow reached the seashore. (Photo).

This debris flow buried a forest road bridge, and sediment flowed onto the site of a concrete plant beside the Mukaehama River, but no particular damage to buildings etc. could be confirmed.

Normally in this region, hourly rainfall of 38mm rarely causes a debris flow and it was rainfall of a scale that does not satisfy the criterion for issuing sediment disaster warning information, so it is assumed that it was the effects of the ash fall that created conditions encouraging the debris flow.

It is thought that the rainfall of June 3 caused the runoff to a certain degree of volcanic ash that was accumulated on the mountain's slopes, but in the torrent, presumably volcanic ash had flowed in and accumulated, and the risk of the occurrence of a debris flow continued to be higher than before the eruption and there was a danger of a large debris flow recurring if rainfall heavier than that of June 3 were to occur.

For the time being at least, within a range of the impact of the ash fall centered on the drainage basin of the Mukaehama River it will be necessary to carefully monitor changes of the state of the torrent, such as whether or not gulley erosion (erosion by rainwater) occurs on the mountain sides.

Details ☛ Kyushu Regional Development Bureau "Activities of the Kyushu Regional Development Bureau in response to the eruption on Kuchinoerabu Island.
http://www.qsr.mlit.go.jp/bousai_joho/tecforce/tec-force_at_kutinoerabu.htm

■ JICA port and harbor trainees from 16 countries accepted by the NILIM

Administrative Coordination Department, International Coordination Division

The NILIM accepted port and harbor related JICA foreign trainees from 16 countries, and researchers at the NILIM lectured them on the most advanced port and harbor technologies etc. The trainees also had an opportunity to enjoy cultural exchanges with citizens of Yokosuka City during their stay.

The NILIM accepts JICA foreign trainees at its Yokosuka Office from various countries every year in cooperation with JICA for its "Sustainable Port Development and Planning (for port engineer)". This year the NILIM accepted 19 trainees from 16 ocean and inland countries in Asia, Central and South America, Africa, etc. (Uruguay, Egypt, Cambodia, Columbia, Samoa, Sri Lanka, Tanzania, Turkmenistan, Tonga, Nauru, Papua New Guinea, Vietnam, East Timor, Philippines, Myanmar and South Sudan).

This program aims to enable each participant to formulate feasible action plans based on issues related to port development and maintenance with the knowledge each acquired through the training course.The program continued from June 3 until August 11, during which part of the training was conducted at the Yokosuka Office with full cooperation of the NILIM from June 15 to July 10.

Photo: Collective photo of JICA trainees

The lectures on the most advanced port and harbor technologies given by researchers from the NILIM and Port and Airport Research Institute (PARI) are "Port Policy Analysis by International Logistic Model", "Planning of Mooring Facilities and Waterways and Basin", "Port Logistics-related Statistical Data", "Outline of Design Standard of Port Structures in Japan", "Port Logistics Improvement by Information System ", "Damage by Great East Japan Earthquake and Tsunami and Rehabilitation Work", and "Environmental Restoration in Port and Harbor", etc. The trainees were also given the opportunity to take tours of research facilities such as the "Large Hydro Geo Flume" that performs experimental tsunami, etc.

To promote cultural exchanges and amicable relationships with Japan and in view of the 150th anniversary of the opening of the Port of Yokosuka, the trainees took part in a courtesy visit to the Mayor of Yokosuka (June 24) and an international exchange gathering at Yokosuka City Shinmei Elementary School (June 25) with school students, which deepened understanding of each other's culture.

In the future, in addition to giving lectures on Japan's most advanced port and harbor technology to JICA trainees who will visit Japan and promoting friendly relationships with Japan, we will exert ourselves to conduct international cooperation including efforts to contribute to regional societies by, for example, enlightening local elementary school children on foreign cultures through cultural exchanges with JICA trainees.

Details ☛ NILIM Yokosuka web site
http://www.ysk.nilim.go.jp/event/index.html

■ Developing a method of clarifying existing wooden detached housing specifications

Housing Department, Research Coordinator for Housing Information System

We have developed a database to support the clarification of specifications in order that existing housing can be appropriately renovated in cases where the original design drawings etc. have been scattered and lost so that the performance levels are unclear.

The Ministry of Land, Infrastructure, Transport and Tourism is working on policies to create a housing market environment permitting the recycling and reuse of the vast housing stock as a good quality public asset. In order to purchase and appropriately renovate an old house, it is necessary to fully understand the

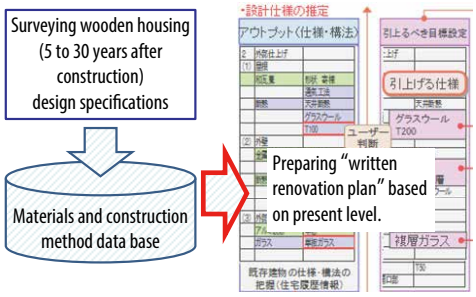

Figure: Outline of the material and construction method database system

performance of the house (durability, earthquake resistance, etc.). A useful way to clarify the performance level of an existing house is to obtain documents such as design drawings and written specifications used to build it, but it is said that in the case of many such houses, these documents are scattered and lost, so that it is difficult to clarify its present condition.

The NILIM has built a database of design specifications by region and year of construction, and has developed a medium to small house builders' work support system in order to reduce the difficulty of clarifying the present state of detached wooden housing in particular.

The materials and construction method database system that has been developed is predicted to be applied to trial operation after users have been registered in order to support their work. In the future, past data about materials and construction methods for various members obtained by field surveys will be fed back, permitting their use as a shared knowledge base.

Details ☛ 2015 Annual Report of NILIM
http://www.nilim.go.jp/english/annual/annual2015/pdf_file/60.pdf

■ Development of the inundation alert system for safety of underground users

River Department, Flood Disaster Prevention Division

Work has begun on the development of an information communication system incorporating a high-speed and high precision inundation prediction program that uses rainfall prediction information. When it predicts that an underground space will be flooded, it provides alert information, preventing damage by unexpectedly heavy rain.

Recently the strength and frequency of unexpectedly heavy rain have been increasing, so the risk of inundation in urban regions of Japan is rising. Particularly, underground space is at high risk that fatal accidents may occur, because it is difficult to ensure lead time to recognize the risk of inundation, evacuate the space, and block the water (Photo) in order to take countermeasures against inundation.

So this technology development program [1] prepared an inundation prediction program that integrates the river and wastewater pipeline networks with a ground surface inundation model, [2] incorporated this program to build an information system that rapidly calculates and automatically distributes inundation predictions based on rainfall prediction data, and [3] developed information contents that are easily understood by recipients and support efficient evacuation and inundation countermeasures. Beginning in 2017, the above system will be used to perform a public experiment that will distribute prediction information.

This research is being conducted based on the Council for Science, Technology and Innovation's Cross-ministerial Strategic Innovation Promotion Program (SIP), "Strengthening Resilient Disaster prevention and Mitigation Functions".

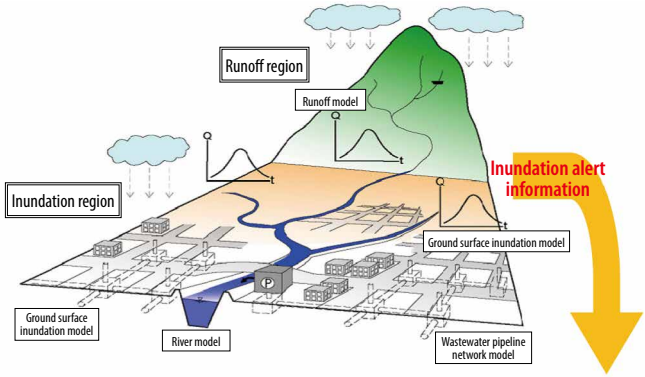

Figure: Image of the Inundation Prediction Model

Photos: Inundation Countermeasures (left: installing a waterproof plate, right: road submersion information)

Details ☛ 2015 Annual Report of NILIM
http://www.nilim.go.jp/english/annual/annual2015/pdf_file/12.pdf

■ The 41st APEC Transportation Working Group

Port and Harbor Department, Port Planning Division

Representative of Port and Harbor Department attended the Transportation Working Group at APEC held in Jeju Island, Korea, made a presentation on the project proposed by Japan, and discussed ways to properly link ports and maritime affairs in the region.

The 41st APEC Transportation Working Group met in Jeju Island in Korea from May 26 to 29, 2015. The conference is held once or twice a year as a Working Group to specifically discuss transportation-related issues among diverse fields under APEC (Asia Pacific Economic Cooperation). The Working Group is divided into plenary meetings, which decide its general direction, and subcommittee meetings of experts in different fields such as land transportation, air transportation, and so on. Mr. Abe, Head of Port Planning Division of the NILIM attended one of these, the Port and Maritime Affairs Experts Subcommittee Meeting. Japan chairs this Experts

Photo : View of the Plenary Meeting

Subcommittee Meeting and actively contributes to its deliberations.

At this meeting, the discussions mainly focused on each project in progress under the leadership of the participating countries. Japan proposed a project to share best practices implemented by each country or region to smoothly accept cruise ships in order to invigorate cruises in the entire APEC region and obtained assent from other countries and regions. Consequently, the project is incorporated in the framework of APEC for further development.

Lively discussions were held on a variety of other topics including measures to lower the environmental load at ports, which has recently become an important issue, and others related to ports and maritime affairs.

Participating in international conferences requires continuity, so the participation of research institutes from other countries and regions is conspicuous. We believe that the NILIM can also continue to contribute to such conferences.

Schedule of Principal Events

Scheduled Dates	Event Name
November 14	Open House (Public Works Day)
December 3	The Lecture Meeting of NILIM (2015)

Publication (research achievements) < June, 2015 - August, 2015 >

Download from here ☛ http://www.nilim.go.jp/lab/bcg/siryou/index.htm

TECHNICAL NOTE of NILIM

No.	Title of Paper	Names of Divisions
830	Risk Management to Maintain Performance and Achieve Early Restoration of Airports after Earthquakes	Airport Planning Division
831	Water quality after tsunami generated by the “Great East Japan Earthquake of 2011”, in Ofunato bay	Marine Environment Division
832	Morphological features of fecal pellets in the invasive alien species Mytilus galloprovincialis (Bivalvia: Mytilidae)which predominates in the fauna on an embankment in Tokyo Bay.	Marine Environment Division
833	Effects on Port Facility Design Regarding the Differences of Natural Disaster Conditions between Japan and Cambodia	Coastal Disaster Prevention Division
834	An Analysis on the Motions of Very Large Bulk Carrier under Reduced Draft	Port Planning Division
835	Analysis of cargo trends between Asia and North America, focusing on the Panama Canal	Port Planning Division
836	Estimation Method for Damage of Mooring Facilities in a Port Subjected to Large-Scale Earthquake	Port Planning Division
837	A Study of the Effects of the Reinforcing Bar Corrosion Initiation Chloride Ion Concentration in Concrete on Life-cycle Cost of Open-type Wharfs	Port Construction Systems and Management Division
838	An Analysis on the Low-cost Carriers (LCCs)'s Entry of Domestic Flights in Japanese Civil Aviation Market	Airport Planning Division
839	The Development of a Program to Calculate ESWL for Airport Flexible Pavement.	Airport Facilities Division
840	A Survey of the Roles of Air Transport in Rural Medical Treatment Activities	International Maritime Policy Analyst
845	Technical note on the energy application methods for plant waste materials derived from urban areas	Landscape and Ecology Division

We provide you with research information.

- 2015 Annual Report of NILIM

  This web site introduces NILIM activities throughout the year, including research activities and achievements, future initiatives, etc.

  Go to this web site: ☛ http://www.nilim.go.jp/english/annual/annual2015/ar2015e.html

National Institute for Land and Infrastructure Management
Ministry of Land, Infrastructure, Transport and Tourism
Asahi 1, Tsukuba, Ibaraki, 305-0804, Japan
(Tachihara) Tachihara 1, Tsukuba, Ibaraki, 305-0802, Japan
(Yokosuka) Nagase 3-1-1, Yokosuka, Kanagawa, 239-0826, Japan
TEL:+81-29-864-2754 FAX:+81-29-864-4322
http://www.nilim.go.jp/english/eindex.htm

国土交通省 Ministry of Land, Infrastructure, Transport and Tourism

No.53
Summer 2015

Edited and Published by National Institute for Land and Infrastructure Management