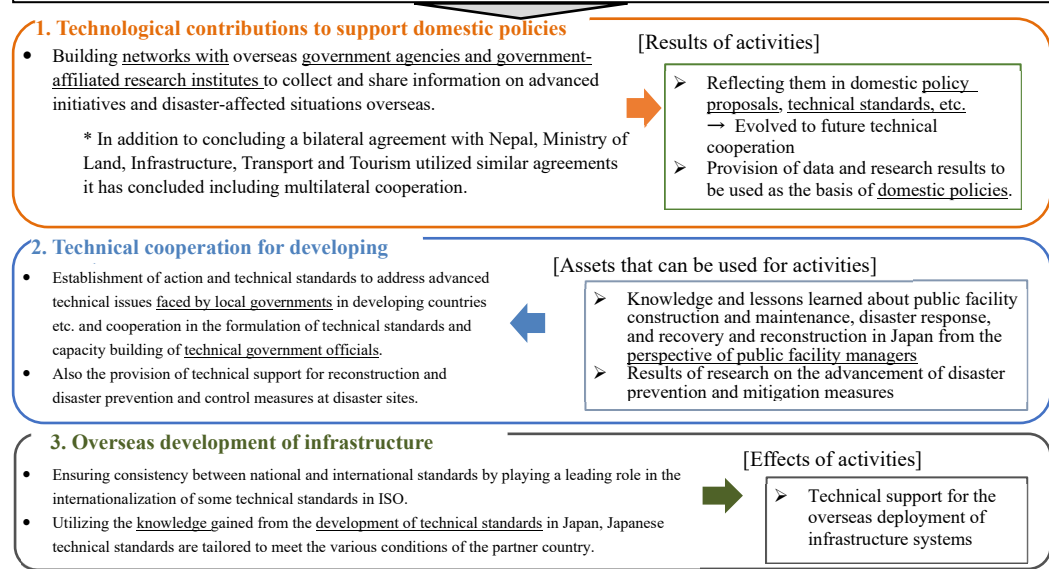


International Research Activities

1. Approach to International Activities

Three pillars of the international strategy of the NILIM and its ideas

- The 2025 Strategy for Overseas Deployment of Infrastructure Systems (December 10, 2020: Special Committee on Comprehensive Strategy Research Infrastructure Export and Economic Cooperation)
- The Ministry of Land, Infrastructure, Transport and Tourism's Action Plan for Overseas Deployment of Infrastructure Systems 2020 (revised on July 7, 2020)



List of major multilateral cooperations	Involved research divisions
ICOLD (International Commission on Large Dams)	River
UNESCAP/WMO (Typhoon Committee)	Sabo
Japan-US-EU ITS Conference	Road Traffic
PIARC (World Road Association)	Road Traffic
RILEM (International Union of Laboratories and Experts on Construction Materials, Systems, and Structures)	Building
PIANC (International Navigation Congress)	Port and Harbor
ICAO (International Civil Aviation Organization)	Airport
IMO (International Maritime Organization)	Administrative Coordination
ISO (International Organization for Standardization)	Water Quality, Building, Road Traffic

Legend

- Agreements** Research agreements with overseas research institutions
- Disaster survey** Examples of experts dispatched for disaster surveys
- Technical cooperation** Technical cooperation such as support for the formulation of technical standards, workshops, etc.
- Countries with a track record of the above activities**

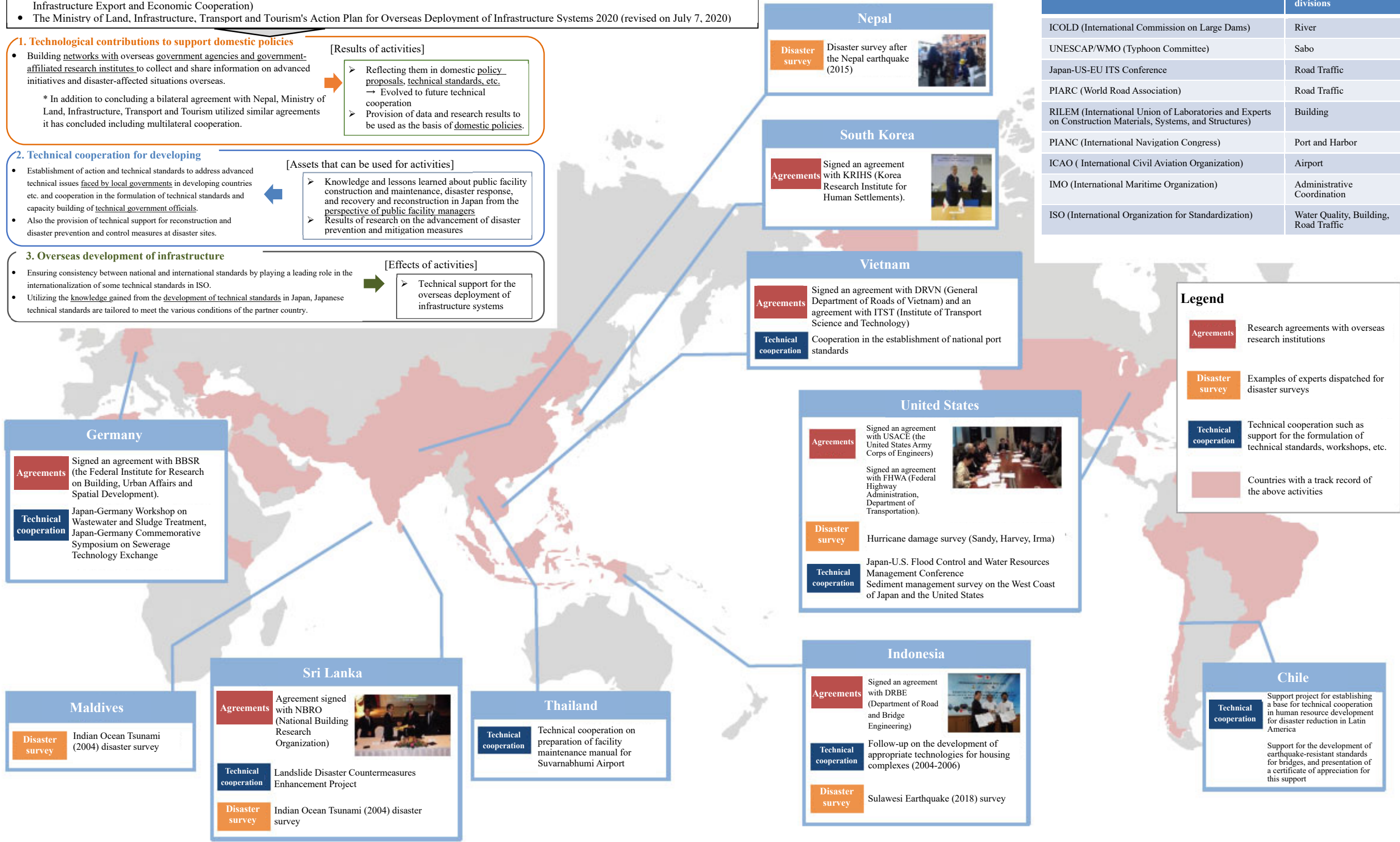


Figure 1. International research activities of the NILIM (main research)

2. Technological contributions to support domestic policies

The NILIM has established a network with overseas government agencies and government-affiliated research institutes by concluding and utilizing various types of cooperative agreements and is collecting and sharing information on advanced overseas initiatives and disaster-affected situations. Results of these activities are used to contribute to domestic policy proposals and reflected in technical standards. Representative examples are as follows.

(1) Cooperation between the Japan-U.S. Flood Control and Water Resources Management Conference and the U.S. Army Corps of Engineers

The Implementing Arrangement between the Ministry of Land, Infrastructure, Transport and Tourism of Japan and the United States Army Corps of Engineers was signed in March 2003 to promote cooperation and coordination between Japan and the United States in the exchange of scientific and technical information related to flood control and water resource management. In November of the following year, the first Japan-U.S. Flood Control and Water Resource Management Conference was held, and a Japanese delegation led by the director of the NILIM traveled to the United States. The NILIM staff members also conducted a series of field surveys based on the above-mentioned Implementing Arrangement and reflected some of the research findings on flood disaster risk assessment methods in the Guidance on Flood Risk Assessment (pilot version) (May 2018). In addition, utilizing the cooperative relationship developed at that time, the NILIM successfully obtained the cooperation of the Army Corps of Engineers in surveying the damage caused by hurricanes.



Figure 2. Visit to the Army Corps of Engineers and Water Resources Institute during the 13th Conference, 2018.

(2) Technical exchange with Germany in the field of sewerage

In order to enrich the exchange between Japanese and German experts on sewerage technology, starting with the first workshop in October 1982 (at the then Public Works Research Institute of the Ministry of Construction), symposia have been held every two to three years between Japan (Sewerage Department of the Ministry of Land, Infrastructure, Transport and Tourism, NILIM, PWRI, etc.) and Germany (Federal Minister of Education and Research, Karlsruhe Institute, etc.). The workshop led to personnel exchanges and joint research. In 2005, a symposium was held to commemorate the series of activities as an event related to the German Year in Japan. As a result of past research exchanges, German technologies have been introduced to Japan, and the technologies the NILIM has worked on through joint research, such as phosphorus removal technology, have become important technologies that support Japan's sewerage business.



Figure 3. Japan-Germany Commemorative Symposium (Tokyo, November 2005)

(3) Hurricane disaster survey (Sandy, Harvey, Irma)

In response to Hurricane Sandy, which struck in October 2012, and Hurricanes Harvey and Irma, which struck in August and September 2017, a survey team (Director-General of

the NILIM) was dispatched to understand the actual situation and lessons learned on disaster and crisis management responses and to obtain useful information for future policy development in Japan.

Hearings and exchanges of opinions were held with related organizations on damage in disaster-hit areas, risk assessment by scale of external force, and crisis management responses based on timelines and their effects and issues.

(4) Survey on landslides on the West Coast of the United States

The West Coast of the United States, like Japan, is located in the Circum-Pacific belt and has the same geological structure as Japan. The area has also been implementing landslide countermeasures similar to Japan's since the first half of the 20th century. A field survey was thus conducted in January 2019 by the Ministry of Land, Infrastructure, Transport and Tourism and the Japan Society of Erosion Control Engineering led by the head of the Sabo Planning Division of the NILIM.

In addition to the development, operation, and maintenance of facilities for landslide control, a survey was conducted in the field, including systematic measures, such as risk management systems, warning evacuation, and hazard maps. This survey was reported at the Working Group on Sediment and Flood Control held at the Ministry of Land, Infrastructure, Transport and Tourism in February 2019 and contributed to the study on planning methods for sediment and flood control.

(5) Contribution to the Japan-U.S.-European ITS Trilateral System

In the field of ITS, which is an important theme in the field of road transportation, it is necessary to develop roadside communication equipment on the infrastructure side, and international standards must be used for government procurement. In order to establish a cooperative system with Europe and the United States, memorandums of understanding for cooperation between Japan and the United States (2010) and between Japan and Europe (2011) were signed at the Road Bureau of the Ministry of Land, Infrastructure, Transport and Tourism. The NILIM, in cooperation with the Road Bureau, has been participating in the Japan-U.S.-Europe Trilateral ITS Conference (since 2010) to exchange opinions on the latest research and development trends and policy development policies for ITS, including automated driving. The NILIM is running the above conference as the co-chair jointly with other co-chairs of the U.S. and Europe.

(6) International Telecommunication Union Radio Communications Division (ITU-R) WP

Oceanic radar has been operated on an experimental basis for monitoring various tidal currents, ocean currents, and drifting garbage. Yet, full-scale operation was not possible because the allocation of frequencies for oceanic radar was not included in the international utilization coordination rules. In preparation for the 2012 World Radio Communication Conference (WRC-12), which was set to discuss the allocation of frequencies for oceanic radar in the 3-50 MHz range, a working group of the World Telecommunication Union Radiocommunication Sector (ITU-R) conducted technical studies. The NILIM staff



Figure 4. Interview with the National Weather Service on Hurricane Harvey (May 2018)

Maddock Debris Basin (Los Angeles County)
Sediment capturing facility installed near a valley outlet



Figure 5. Field survey (United States, January 2019)



Figure 6. The first Japan-US-EU ITS Conference (Tokyo, October 2010)



Figure 7. Discussions in the ITU-R WP (November 2012)

prepared recommendations and reports for technical studies in the ITU-R working group, served as the Asian regional coordinator for the WRC-12, and participated as a Japanese delegation, requested nine bands, and was approved for the allocation of eight bands in the 4-39 MHz band.

3. Technical cooperation for developing countries, etc.

The NILIM provides support to address technical issues faced by local governments in developing countries etc. and to formulate technical standards and build up capacities of technical government officials. Also, in the event of a large-scale disaster overseas, the NILIM dispatches experts to provide technical support for reconstruction and disaster control measures at the disaster site.

Representative examples are as follows. A total of 373 JICA training programs and 3,073 trainees were accepted from FY 2001 to FY 2020.

(1) Technical cooperation in Chile

The NILIM and the PWRI have been providing technical support to the Chilean government through JICA for the development of new seismic standards for bridges based on the damage caused by the earthquake that hit Chile in 2010 in response to the request made by the Government of Chile. In June 2017, a new seismic standard for bridges was formulated based on Japanese seismic technology. In October of the same year, the Chilean government's Ministry of Public Works presented a letter of appreciation for the technical support. The NILIM also cooperated with JICA's "Support Project for Human Resource Development for Disaster Reduction in Latin America" (commonly known as the KIZUNA Project). In this project, the NILIM provided technical cooperation of introducing its knowledge on earthquake-resistant bridges and tsunami resistance and given lectures to Chilean Ministry of Public Works officials on the formulation of technical standards based on past earthquake damage to buildings.

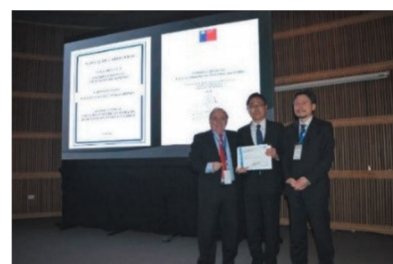


Figure 8. Certificate of appreciation for the development of seismic standards for bridges (October 2017)

(2) Survey of damage caused by the Sumatra earthquake and Indian Ocean tsunami etc.

The Indian Ocean tsunami was triggered by the earthquake off Sumatra Island on December 26, 2004. Immediately after the disaster, the NILIM dispatched a total of 16 experts (as of December 28, 2005) from eight research teams, including JICA's international emergency relief team and government survey teams, to six countries, including Indonesia and Sri Lanka. They conducted urgent field surveys on earthquake and tsunami damage in various fields with the aim of investigating the direction of assistance to disaster-stricken countries and clarifying the disaster mechanisms necessary for future disaster prevention. Since then, they have provided reconstruction assistance in many fields, including technical guidance on housing reconstruction by taking into account labor and material procurement.



Figure 9. Visit to the Army Corps of Engineers and Water Resources Institute during the 13th Conference (2018)

(3) Survey of earthquake damage in Nepal and advice and guidance for reconstruction

In the aftermath of the massive earthquake that struck Nepal on April 25, 2015, personnel from the NILIM, the PWRI, and the Building Research Institute were dispatched

as members of the reconstruction support survey team dispatched by JICA for about three months from May to July. In Nepal, they surveyed major disaster-hit areas and conducted interviews to understand the status of damage to cities, housing, and infrastructure. They also provided advice and guidance to Nepal on earthquake reconstruction planning based on the knowledge and lessons learned from Japan's earthquake reconstruction efforts.



Figure 10. Damage caused by the Nepal earthquake

(4) Technical cooperation on preparation of facility maintenance manual for Suvarnabhumi Airport in Thailand

In preparation for the opening of Suvarnabhumi Airport, the new international airport in Thailand, in September 2006, NILIM staff members were dispatched to Thailand as JICA short-term experts three times in July and October 2005 and May 2006 to provide technical support to establish the maintenance and management methods for the airport pavement. Specifically, the delegates held discussions on the airport pavement maintenance manual and the airport pavement structural evaluation method developed by Airports of Thailand (AOT) and JICA, and listed the matters that should be operated by AOT before the opening of the airport. They also provided technical advice on these operations.



Figure 11. Discussion (May 2006)

2.

Contributing to the field using technology

4. Overseas development of infrastructure systems

The NILIM participates in committees for international standardization at ISO in fields that only the NILIM has been working on or in which the NILIM has strengths by utilizing its knowledge of the formulation of technical standards and manuals that support important policy developments faced in Japan. In addition, in some fields, the NILIM has contributed to the facilitation of the overseas expansion of Japanese technologies by working on the promotion of international standardization of Japanese technical standards, such as preparing working drafts and leading discussions, and ensuring consistency between domestic and overseas standards. Representative examples are as follows.

(1) Contribution to ISO deliberations

For the International Standardization Organization (ISO), many staff members of the NILIM were appointed as members of the Japanese delegates to technical committees (TC) and contributed to the preparation of working drafts in subcommittees (SC) and working groups (WG), submission of opinions and proposals to the drafts, and deliberations and voting in the international standardization process. They have contributed to the deliberations and voting in the international standardization process as a member of the Japanese delegation. Major examples are TC92 (Fire Safety) [Construction Sector], TC204 (ITS) [Road Transport Sector], TC224 (Water Supply and Sewerage Services), PC253/TC282 (Recycled Water Use) [Sewerage Sector], PC251 (Asset Management) [Sewerage Sector etc.].

With regard to TC204, the NILIM organized the Infrastructure Steering Committee, which serves as the secretariat, to coordinate the basic policy on matters related to roads and important individual issues in the domestic committees and played a role in coordinating mutual cooperation among industry, academia, and government.

(2) Contribution to the revision of guidelines for the establishment of port-related administrative procedure systems (IMO)

In April 2019, the United Nations' International Maritime Organization (IMO) approved and circulated to contracting governments a full revision of the Guidelines for Setting Up a System of Port-Related Administrative Procedures (GUIDELINES FOR SETTING UP A MARITIME SINGLE WINDOW). This Guideline is intended to guide the establishment of an efficient single system for port administrative procedures required for the entry and exit of ships in compliance with the procedures set forth in international standards.

The NILIM staff member was selected as the chairperson of the working group and responded to more than 1,600 opinions from various countries, reflecting the knowledge and research results accumulated in Japan, which has achieved international standardization of procedures and unification of systems. The staff contributed to the international initiatives and improved the international competitiveness of Japanese ports and harbors.

(3) Cooperation in the development of Vietnam's national port standards

Based on the Memorandum of Understanding for Cooperation in the Development of National Technical Standards for Port Facilities in Vietnam signed in March 2014 (updated in July 2016 and October 2020), the NILIM and the Institute of Transport Science and Technology in Vietnam have been collaborating to conduct studies and workshops. To date, eight Vietnamese national technical standards for design, construction, and maintenance have been formulated in accordance with Japan's technical standards for ports and harbors—six of which are officially in force (the remaining two are under review). Starting in FY 2020, the study has been continuing for two items: breakwaters and dredging and reclamation.

(4) Contribution to the Typhoon Committee (UNESCAP/WMO)

The Typhoon Committee, established as a joint agency of the World Meteorological Organization (WMO) and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), implemented the Landslide Warning Information Establishment Project (2002-2009) and the Landslide Hazard Map Project (2009-2011) to reduce damage from typhoons. In these projects, the NILIM, in cooperation with the Erosion Control Department of the Ministry of Land, Infrastructure, Transport and Tourism, customized the technologies developed in Japan for predicting landslides, setting up danger zones, and creating hazard maps to inform the public, while conducting field tests with participating countries. The NILIM thereby contributed to the global dissemination of these technologies.



Figure 12. The IMO working group. (April 2019)

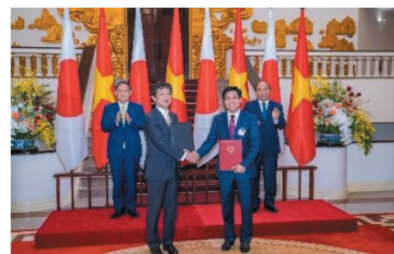


Figure 13. Signing ceremony for the MOU (October 2020)



Figure 14. Field training using a model stream (China, September 2010)

5. List of related reports and technical documents

Technical Note of NILIM No. 749 pp. II 179- II 180, II 187- II 190 <http://www.nilim.go.jp/lab/bcg/siryounn/tnn0749.htm>

Technical Note of NILIM No. 304 pp. 1-2 <http://www.nilim.go.jp/lab/bcg/siryounn/tnn0304.htm>

Civil Engineering Journal 59-7 pp. 48-49