Human resource development and research environment

1. Initiatives

1) Human resource development

The research personnel of the NILIM, who are working on research issues closely related to the government, must have ①the ability as a researcher and ②a sense and understanding of the government and the field. The NILIM is nurturing personnel who can view policy development from both the research and administrative/field perspectives by acquiring both of these skills.



Figure 1. Human resource development at the NILIM

Among the basic competencies of a researcher are the abilities to organize and understand a problem, set up a research plan, and interpret data. In order to foster these skills, researchers of the NILIM submit papers to academic conferences, participate in academic conferences, hold lectures and research presentations to pass on experience and know-how, and conduct various study groups. Various other efforts are being made to develop the basic skills of researchers. The specifics of the main initiatives are as follows.

①Lecture to pass on experience and know-how

This type of lecture has been held since 2016 with the aim of passing on practical research know-how from senior and experienced researchers across fields, affiliations, and generations to be in line with the research policy, Preparedness for Research. Lectures are held on various themes, such as research preparedness and skills acquisition in general, how to proceed with research work, and how to interpret the field and data. The experiences and lessons learned by senior staff are handed down to the staff in the institute to help them improve their skills.



Photo 1. Lecture

2 The NILIM research presentation

This event has been held since FY 2003 for the purpose of promoting cross-disciplinary exchange and information sharing within the institute, improving the communication skills of researchers, increasing motivation through awards and other means, and identifying nominees and themes for the Land and Infrastructure Engineering Conference. The 18th event was held in 2020.

The presentation session provides three types of awards: the Grand Prize, the Excellence Prize, and the Special Prize. Presentations are evaluated in terms of the content of the research, its applicability to policy and practice, the ability to explain, and the ability to answer questions.

3.



Photo 2. Presentation session

③Study group

Various study groups are held for research staff with the aim of acquiring knowledge of the technologies in different fields. Staff from related research divisions held study groups on AI and smart cities.

The ability to manage research is being improved through the research planning review meeting, where research objectives and plans are discussed within the NILIM, and the External Evaluation Committee, where external experts evaluate research plans and content. These capabilities are expected to improve through management, such as the development of technical standards as well.

The sense and understanding of administration and the field are formed through the experience of administrative work at Regional Development Bureaus etc. and the experience of disaster field support. In addition, since the research is conducted using large-scale experimental facilities that reproduce actual or near-actual conditions and various data measured at actual sites, researchers can carry out their research with an image of the actual field situations.

2) Personnel exchange

The NILIM accepts personnel from universities and other research institutes, private companies, Regional Development Bureaus, and local governments. By utilizing various systems, such as personnel exchanges with various institutions, fixed-term researchers, and researcher exchanges, the NILIM has formed an organization with diverse human resources and is able to incorporate outside knowledge and sensibilities. The NILIM also dispatches staff as part of personnel exchanges, which enables it to incorporate the senses of the private sector and the field, leading to the advancement of research and smooth deployment to the field.



Figure 2. Personnel exchange with other organizations

3) Research environment

The NILIM has a large number of experimental facilities and databases, which are used to carry out research. Experimental facilities are available in various sizes and types. The most distinctive feature of the experimental facilities at the NILIM is that there are many experimental facilities that can conduct large-scale experiments that reproduce real or near-realscale situations. By conducting experiments using these facilities, the NILIM researchers are able to produce research results that directly relate to practical applications. The NILIM has also constructed the environment where researchers collect various data measured at actual sites across Japan and carry out researches using the actual data. * For data collected by the NILIM, see "Data collection, analysis, and application of findings to society" (page 258).

River hydraulic experiment facility, river model

Indoor and outdoor facilities with simulated models of various rivers. The indoor river hydraulic experiment facility is capable of reproducing sediment and flood inundation phenomena etc. to conduct a large-scale experiment on sediment hydraulics. In the outdoor river model experiment facility, a maximum of 15 river models can be set up on a vast 15-hectare site. These facilities enable various hydraulic model experiments that reproduce actual rivers to understand hydraulic phenomena and use findings for flood countermeasures.



hydraulics at the river hydraulic experiment facility



(plane flow) at the river hydraulic experiment facility



Experiment at the river model experiment facility

Test track

Test track with the total length of 6,152 m. Experiments on road drivability, safety, road-vehicle coordination technology, etc. are being conducted. The results of these experiments are reflected in the Road Structure Ordinance and other road-related technical standards. The track consists of a straight line and a loop, and the banks (inclines) on the loop allow the vehicle to go around without slowing down, which make it possible to conduct experiments at high speeds (100 km/h to 120 km/h). In addition, the straight section with three lanes can be used to recreate various road conditions in experiments





two-stage crossing facility



A bicycle traffic space experiment

Full-scale tunnel experiment



Entire view of the full-scale tunnel experiment facility



A fire experiment

With a length of 700 m and a cross-sectional area of 45.5 m², it is a full-scale tunnel of a scale unparalleled anywhere in the world. The tunnel has been used in various experiments, such as fire tests on a real bus to understand the smoke flow, etc., which is used to study the standards for the design and operation of ventilation, disaster prevention, and other facilities in tunnels.

Experimental channel with large-scale embankment model

Using a full-scale model, the external forces acting on river structures such as embankments and their failure mechanisms are studied, and a rational design method f river structures is discussed. The "crisis management type hard measures (devising a levee structure that extends the time until the levee breaks as much as possible)" to mitigate damage even in the event of flooding is being implemented based on the knowledge obtained from experiments conducted at this experimental channel and through other means.



Installation of a full-scale model of the levee

management-type hardware measures.

Other

Fire tests are conducted using a full-scale building using a large experimental facility to examine fire safety standards.





Aircraft loading system

Various experiments are conducted on airport pavements such as runways, taxiways, and aprons, using a device that carries the same oad as a real aircraft (B747-400).



3





A portion of the actual bridge is used to study the maintenance and management standards for road bridges, and to conduct research to examine technical standards for design and construction.

For example, by examining the strength of a bridge that has been reinforced with plates, it is possible to determine the effect of repair and reinforcement.



A fire experiment using three-story wooden building

Experimental channel for typhoon and disaster management

This is one of the largest wind tunnel tanks in Japan, where hydraulic model experiments related to storm surge and other phenomena are conducted. Research on protecting large cities from storm surges, waves, and tsunamis is conducted using a wind generator to generate typhoon winds and a current generator to generate currents.

