

# Research of the NILIM: Past and Future

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## 1. Activities of the NILIM over the past 20 years

The National Institute for Land and Infrastructure Management (NILIM) was established on April 1, 2001, by reorganizing the Public Works Research Institute, Building Research Institute, and Port and Airport Research Institute of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). The activities conducted since then were compiled into the "20 Years' Experience -- NILIM" ("20-year History") last year.

Although priority research themes of the NILIM changed from time to time over the past 20 years, we have divided our research into three major categories based on the NILIM's essential mission of "Safe, secure, energetic and beautiful national land and society": 1) Research to strengthen the national land and protect people's lives and livelihoods, 2) Research to enhance the productivity and growth potential of society, and 3) Research to support comfortable and secure living. These categories are referred to as "Strength," "Use," and "Beauty," respectively, in the 20-year History. Based on this classification, 47 research projects have been presented along with relevant reports and technical data. Fig. 1 shows some examples of R&D described in the 20-year History. In compiling this 20-year History, I was involved in organizing the department's past researches as the research department director, and had ample opportunity to reflect on how we researchers have conducted our activities within the social context and policy trends of our respective eras. The R&D activities over the past 20 years have been diverse, and the activities presented are just a few of them.

In addition to the R&D described above, the 20-year History also introduces the "Technological contributions to sites" (advanced technical support for disasters and accidents, international research activities, improvement of on-site technical capabilities, collection and analysis of data, and return of data to society) and "Development of the environment supporting research" (management support for high-quality research, human resource and research environment development, and public relations activities).

This 20-year History is posted on the NILIM's website. Each research can be viewed individually, so we hope you will take a look at it, starting with the area that interests you.

### [Strength: Research to strengthen the national land and protect people's lives and living]

- ✓ Technologies for identifying and forecasting floods installed as the Flood Risk Line
- ✓ Technologies required to create Sediment Disaster Alert Information
- ✓ Development and revision of inspection guidelines required for statutory inspections of road structures
- ✓ Revision of technical standards for building structures in light of earthquake, heavy snowfall, and strong wind damage.
- ✓ Technologies, etc. introduced in standards, guidelines, etc. for airport civil engineering facilities

### [Use: Research to enhance the productivity and growth potential of society]

- ✓ Technological development in the sewerage field through the B-DASH Project
- ✓ Technologies introduced in technical standards for port facilities that are being developed abroad
- ✓ ICT construction for i-Construction promotion
- ✓ Creation of various standards for BIC/CIM

### [Beauty: Research to support comfortable and secure living]

- ✓ Traffic safety technology for arterial roads using ETC2.0 data
- ✓ Maintenance of various manuals, etc. related to condominium rehabilitation
- ✓ Proposal for "Wind Path" as a countermeasure to urban heat islands
- ✓ Environmental assessment method for coastal areas

**Fig. 1: Examples of R&D projects described in the NILIM's 20-year History**

## 2. Evaluation of current research activities

As introduced in the section on "Development of the environment supporting research" in the 20-year History, the research activities of the NILIM have been subject to evaluation by the Research Evaluation Committee (the "Committee") composed of external experts. In addition to an annual evaluation of individual research projects, the NILIM undergoes an "institutional evaluation" (evaluation of institutional management performance) once every five years. Since the last fiscal year was an interim year of this evaluation, we decided to review the institutional evaluation criteria (evaluation criteria) established in 2018, as shown in Fig. 2, in preparation for the "Institutional Evaluation" coming two years later. To contribute to the consideration of the appropriateness and review of the evaluation criteria, we confirmed the conformity of the research activities with the evaluation criteria in some broad categories, i.e., "Examples of activities related to River Basin Disaster Resilience and Sustainability by All" and "Examples of DX-related activities in the infrastructure field." As a result, we have received opinions from the Committee about the importance of cross-disciplinary research, long-term perspective research, etc., rather than a review of the overall

structure of the evaluation criteria.

Although "River Basin Disaster Resilience and Sustainability by All" is a new policy initiative launched recently by the MLIT, the NILIM has been conducting related research for some time. Extensive activities through the Climate Change Adaptation Research Group, one of the mechanisms for cross-sectional collaboration within the NILIM, have produced research results that have contributed to "River Basin Disaster Resilience and Sustainability by All" in the past.

One such research introduced in the 20-year History (the related research as a whole has been ongoing for about 20 years) is titled "Advanced methods for identifying and forecasting floods". As a result of this research, there is now the "Flood Risk Line", but it would have been impossible to imagine the future that the practical application of today's technology would bring. However, "River Basin Disaster Resilience and Sustainability by All" in response to climate change is looked at as a paradigm shift, so, while advancing ongoing research, it is also necessary to consider new research from a long-term perspective and an expanded scope.

Research that contributes to "River Basin Disaster Resilience and Sustainability by All" is introduced here as an example, but it is necessary to consider future research activities in a timely manner, review the 20-year history of our activities and consider changes in the social environment, the opinions of the Committee (long-term perspective, collaborative activities), etc.

**[I. Implementation and promotion of R&D]**

- (1) R&D supporting the proposal, planning and dissemination of MLIT's policies
- (2) Technical support for response to disasters and accidents and upgrading of countermeasure technologies
- (3) Supporting the improvement of on-site technical capabilities of local Regional Development Bureaus, etc.
- (4) Collection, analysis, and management of data as the technical basis for policy proposal and planning, and return of data to society

**[II Institutional management]**

- (5) Establishment of a management structure to support high quality research
- (6) Fostering of human resources who can steer policy development from both research and administrative on-site perspectives, based on technology.
- (7) Ownership and functional reinforcement of experimental facilities, etc. to support technical research and development in the housing and social infrastructure fields
- (8) Effective dissemination of research results and activities

**Fig. 2: Institutional Evaluation Criteria  
(established in 2018)**

### 3. For the future

In moving things forward, there are "backcasting" and "forecasting," which are not new terms. Backcasting is "thinking about how the future should be and what needs to be done to achieve it," while forecasting is "thinking about building up possible improvements

from what we have now and connecting them to the future." As such, backcasting is important to the greater goal of "achieving carbon neutrality in 2050," while forecasting seems realistic for individual initiatives and individual research projects. So, for example, when analyzing and forecasting the competency of current research with an eye to the future (goals), if research needs to be accelerated or expanded in inadequate areas, etc. in order to reach the goal, various types of collaboration, such as joint research and commissioned research, might be effective.

To seek research collaboration, it is important to have a good grasp of information in various fields. There are "T-shaped people" and "pi-shaped people," which might be overused terms. It is essential to have knowledge and information in multiple fields on the horizontal bar, with the core technologies on the vertical bar. In R&D, individual researchers are of course the most important, but now that the target fields are expanding greatly, I feel that it is necessary to collect information in an organized manner. In this regard, I think that initiatives such as cross-sectional organizations and theme-specific study groups for intra-office collaboration may be useful.

### 4. Conclusion

Regarding the provision of information on dam operations in the event of a flood, the steps of "communication," "comprehension" and "action" are considered necessary. This train of thought could also be applied to developed technologies. For example, when publicly announcing a developed technology, it is necessary not only to communicate information on the developed technology, but also to make sure people understand the information, and to think about how to encourage them to take actions (use). Even in the R&D stage, it is necessary to know well the actual site where the technology will be used, and to consider the path to action (use). The NILIM is, as a research environment, close to the target site, and we intend to continue to use this position of ours to produce the best results.

☞ See the following for details.

1) 20-year History of the NILIM

[http://www.nilim.go.jp/lab/bbg/20nenshi/index\\_20years.htm](http://www.nilim.go.jp/lab/bbg/20nenshi/index_20years.htm)

2) River Basin Disaster Resilience and Sustainability by All

<https://www.mlit.go.jp/river/kokusai/pdf/pdf21.pdf>