

Perspectives of NILIM's Activities

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key words: technical support, diverse perspectives, experience and history,

1. NILIM seen in the recovery from the Kumamoto Earthquake

On March 7, 2021, a ceremony was held to inaugurate the New Aso Bridge, which was constructed under the authority of the national government to restore the Aso Bridge (managed by Kumamoto Prefecture) on National Route 325, which had collapsed in the Kumamoto Earthquake. The ceremony was attended by Mr. Akaba, Minister of Land, Infrastructure, Transport and Tourism, and Mr. Amano, Director-General of NILIM (photo). In the ceremony, Mr. Tetsushi Sakamoto, Minister of State for Special Missions of the Cabinet Office, gave a speech on behalf of the locally elected Diet members as a congratulatory speech by the guests of honor, stating "NILIM, as the best brain of the Ministry of Land, Infrastructure, Transport and Tourism, also provided us with human resources. With the world's top level of technology, we were able to open a tunnel exceeding our expectation, as well as Hohi Line, Route 57, and the Choyou Great Bridge. As a local resident, I would like to express my heartfelt gratitude. I believe that today's opening ceremony is the result of the united efforts of the local community, Diet, government, technology, and State."

As stated in this congratulatory speech, immediately after the Kumamoto earthquake, NILIM dispatched staff in cooperation with the Public Works Research Institute to conduct on-site surveys and advise on emergency restoration.

In April 2017, NILIM established the Kumamoto Earthquake Recovery Division in the affected area, which has been working together with the Kumamoto Restoration Division of the Kyushu Regional Development Bureau, the main implementer of the construction work, as a two-wheeled team. In parallel, we are investigating the characteristics and causes of damages in order to prevent the

occurrence of similar damages, and explaining them at the relevant councils and proposing revisions to engineering standards. In addition, the Kumamoto Earthquake Recovery Division is conducting research unique to a laboratory established in the affected area.



Photo: New Aso Bridge Opening Ceremony

These research activities can be regarded as practical examples of "Advanced technical support for response to disasters / accidents and upgrading of countermeasure technologies" as stated in the research policy of NILIM. The following introduces some perspectives of these research activities of NILIM.

2. Diverse perspectives

When the Kumamoto Earthquake occurred, I had the opportunity to respond to it as the head of the Road

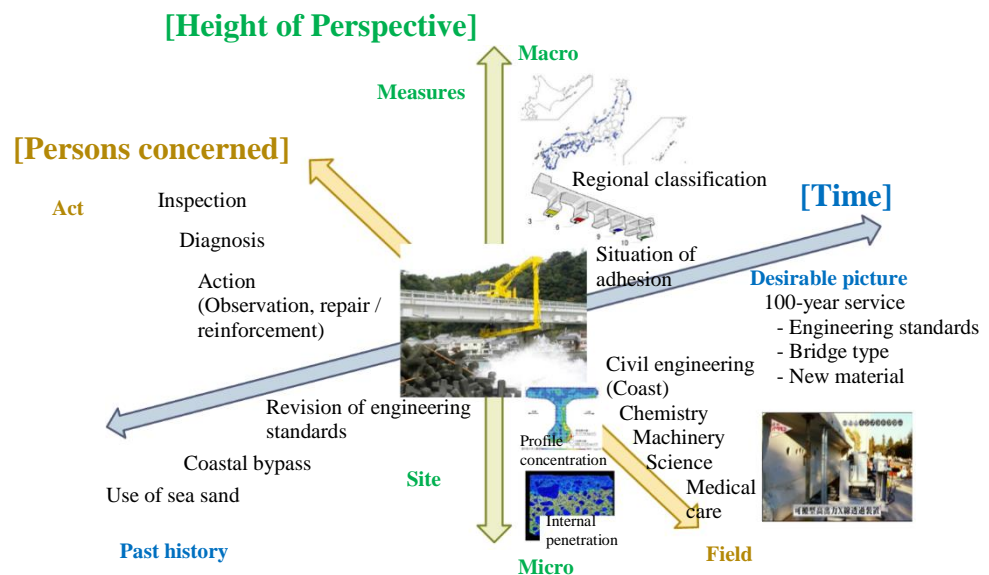


Fig. Three perspectives of research activities

Structures Department. Then, as an action policy, I presented two roles and three basic attitudes. One of the basic attitudes is to "Look at three points." The three perspectives are "Look ahead" (What is required next?), "Look up and down" (What are the supervisor and staff doing?), and "Look sideways" (What are the neighbors and each institution doing?). These three perspectives referred to a "hawk's eye and ant's eye." As similar expressions, there are "bird's eye, insect's eye, fish's eye, and bat's eye."

Diverse perspectives are essential to research activities as a research institute that supports the planning, formulation, and dissemination of national land transportation policies. As an example of such activities, let me introduce a case of salt damage to a road bridge. In the center of the Figure is a photo of a road bridge built at the entrance of the port. It was damaged by salt and has been reinforced with external cables. The three axes can be considered the perspectives of response.

The vertical axis shows the height perspective, which can be referred to as the hawk's eye and the ant's eye mentioned above. The analysis ranges from macroscopic analysis, such as the location of the bridge construction and situation of damage, to microscopic analysis, such as salt adhesion to the surface of each bridge member, salt concentration in the cross-section, steel corrosion, and penetration into the interior of the bridge. There are also such perspectives as planning measures that apply commonly across the country and measures that correspond to the specific site.

One of the horizontal axes is the time axis. It might be close to the "fish reading the current" as introduced above. In order to respond to current structures, we need to understand the past history, which includes the use of sea sand as a material, coastal bypass construction as a location of road construction, and the revision of engineering standards. In addition to addressing such existing structures, it is necessary to prevent similar damage from occurring in future construction. Accordingly, we need to set a service period of 100 years as a desirable picture and establish engineering standards for achieving it, desirable bridge types, and methods for using long-durable materials.

On the horizontal axis, "act" and "field" were also set as diverse stakeholders. This includes the "bat's eye seen from upside down" as stated above. The acts include inspecting deformations, conducting soundness diagnosis, and determining and implementing measures such as observation, repair, and reinforcement, and each of these actions is carried out by different entities. As for fields, not only the structural field, but also the coastal field is necessary in this case, and knowledge of the chemical field is also imperative to clarify mechanisms. In addition, some technologies for inspection and diagnosis can be used not only for machinery but also in the science

and medical care fields. The latest information from overseas is also useful.

As described, research and development to support national policies requires diverse perspectives and practice from various approaches, but it is obviously impossible for a single researcher or laboratory with a limited number of researchers to conduct all of these actions. At NILIM, as a general research institute, researchers in each field engage in research activities by sharing information as appropriate, and work in cooperation with various research institutes, government agencies, and private companies by sharing roles according to the stage of technological development.

3. Learn from experience and history

Researchers at NILIM, which is responsible for the aforementioned activities, are required to have the knowledge and experience of high-level experts in their fields, as well as the ability to propose and implement realistic solutions by understanding the positions and intentions of the persons concerned. There is a saying, "Fools learn from experience, wise men learn from history." This is known as a saying of Bismarck, the first Chancellor of the German Empire, and means that a fool learns only from his own experience, but a wise man learns from the history experienced by others. Based on this train of thought, I think that a man is no longer a fool if he can learn from his own experiences and accumulate his own experiences as knowledge. In addition, a wise man will learn many things, including history, as the accumulated experiences of others, which is academic knowledge. In the civil engineering field, existing structures and past technical standards represent history, and research papers can also be considered history.

The Kumamoto Earthquake Recovery Division, mentioned above, not only provides technical advice on the restoration of damaged structures, but also actively compiles and generalizes technical findings as research papers. In this way, NILIM also has the mission of recording history for the benefit of other engineers. The message of Director-General Amano in this NILIM Report is that the "proper research attitude is to thoroughly pursue the essence in order to systematize the chaotic reality of this world and manage that reality more appropriately." Through research activities, NILIM will contribute to the realization of a safe, secure, active, and attractive homeland and society.