Messages from Departments and Centers of NILIM

Greater Achievement in Studies of Disaster Prevention / Maintenance / Environment by Strengthening the Incorporation of Vertical and Horizontal Structures

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NILIM studies connect with the field for real management and cover a wide range of infrastructure

The NILIM is "vertically structured" in that each research department directly supports technological policy for a different kind of infrastructure or area (e.g., sewerage, rivers, roads, buildings, housing, urban areas, coastal and marine areas, ports and harbors, or airports). It is also "horizontally structured" in that each research center addresses cross-sectional issues that fall under the headings of management and informatization. Uniquely, the NILIM maintains good communication with engineers who are implementing technological policy in the field, while also researching a broad scope of highly specialized issues in land and infrastructure management (**Fig. 1)**.

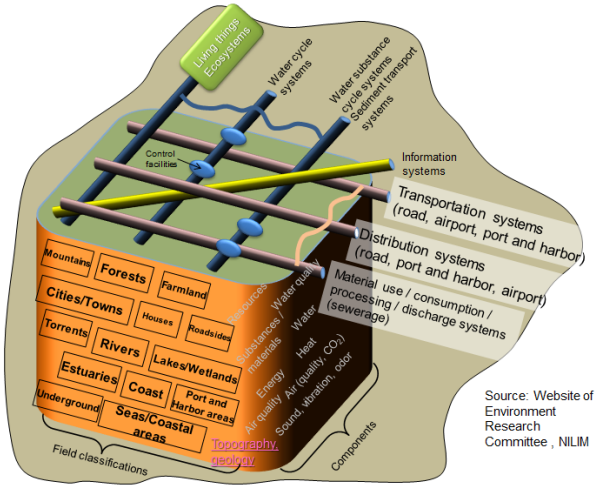

Figure 1: Bird's-Eye View of National Land System ---
Research projects of NILIM cover about 70% of the items above.

Reasons for increasing importance of incorporation between vertical and horizontal structures

As **Fig. 1** shows, the national land system consists of various fields, factors, and systems. For example, each type of social infrastructure is greatly different from others, much in the way that giraffes, hippos, and lions are different. They are so different that we might be perplexed to think whether they need to be handled by a cross-sectional approach. However, just as giraffes, hippos, and lions share a common ecosystem, various kinds of infrastructure have common characteristics and are connected with each other—constituting a national land system.

There are considerable differences in the current approaches to maintain different kinds of infrastructure such as sewerage systems, river hydraulic structures, and roads, which is becoming an important issue. However, a comparison of commonalities among types of infrastructure reveals that there are approaches that can and should be mutually adopted in order to appropriately maintain our infrastructure.

Furthermore, in continuing to promote technology policy for land and infrastructure management, it is necessary to overcome various issues under ever more challenging conditions, such as excessive external forces and climate change, rapidly aging infrastructure, and complicated matters that must be coordinated when implementing environmental conservation / restoration projects. Under such circumstances, while upgrading the skills on each kind of infrastructure -- "giraffe," "hippo," and "lion," it is necessary to pay attention to other matters, look at them as groups, and then work out well-conceived visions and measures.

In 2014, the NILIM will further strengthen the framework for incorporating its vertical and horizontal structures, both in terms of organization and administration. As reflected in the title of this paper, the primary targets of such efforts are disaster prevention (disaster reduction and crisis management), maintenance (maintenance of social infrastructure), and the environment (conservation and restoration).

Points for leading horizontal function to achieve

It is not so easy to crosslink each research field. Sometimes, the connection itself mistakenly becomes the objective. For a horizontal structure to really demonstrate a true effect, the following three points are essential.

(1) To assemble a complete picture of the issues, identify targets, study approaches, and maintain perspective.

The complete picture should be founded on an underlying basic principle that is in turn based on an understanding of real situations; no effort should be organized abstractly or superficially. **Figure 2** attempts to

show the overall composition of social infrastructure maintenance from a viewpoint of "what should we work out." If any of the requirements, flows or cycles shown in this figure is unsatisfied or inactive, an issue will occur with maintenance.

As known from this figure, there are various points where an issue could occur, e.g., technology development processes, interfaces between needs and seeds when applying such technology, the acquisition of technical knowledge that constitutes the core of maintenance, and the dissemination and practice of maintenance engineering which necessarily includes building institutional systems and securing human resource. In each of these cases, the responsive measures will be different. Looking at the situation as a whole, it is necessary to make constant efforts to clarify what issues a project aims to address. With such approach, it should become easy to identify the matters for which a horizontal structure is particularly useful, matters accumulated in past studies, results of approaches in other fields, etc. Hence, a "next-best approach" can reasonably be chosen.

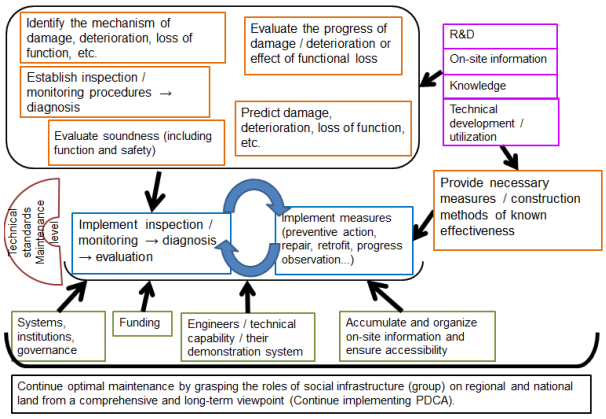

Figure 2: Attempt to Map the Conditions for Continuous Good Quality Maintenance of Social Infrastructure (In reference to discussions made by the stock management workshop, which is an internal cross-functional approach.)

(2) Activities should be arranged by counting back from the goal.

Figure 3 shows a composition (the upper half of a figure) wherein an event (external force) acts on the national land system shown in **Fig. 1** and causes a disaster that impacts people and society. The lower half of the figure shows a situation wherein various technical measures are developed and arranged in a well-coordinated way based on an understanding of the response of the national land system. These measures contribute to preventing or mitigating damage.

To address a serious disaster, such as a Nankai Trough Earthquake or earthquake directly under Metropolitan Tokyo, which is expected to be broad and complex, it is particularly important to establish specific objectives that will minimize the damage in target areas, and choose an approach that takes in all possible measures, combines them organically and make the best use of them, without taking the approach of merely bundling the existing results (i.e., what we know we can do) accumulated in individual technical fields. Working backward from the goal in **Fig. 3** will upgrade the policy on individual studies and automatically help provide perspective across individual studies.

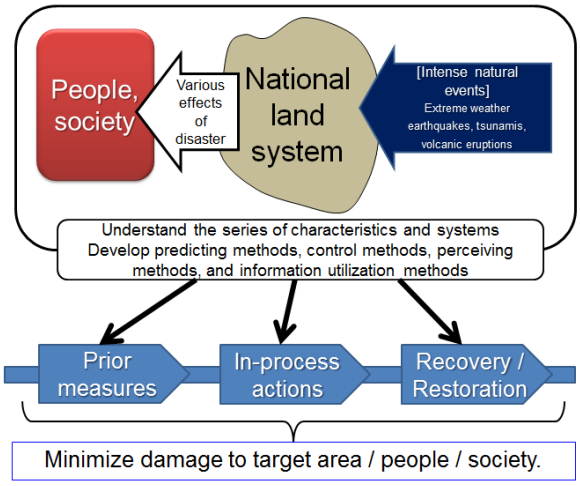

Figure 3: Relationship between Study of Disaster Prevention and Mitigation Based on an Understanding of Responses of the National Land System to Events and Implementation of Countermeasures (In reference to discussions made by the crisis management workshop, which is an internal cross-functional approach.)

Vertical and horizontal structures working hard together

This is the third point. As a major premise for horizontal structures to achieve results, vertical structures, that is to say, technologies in each field should be firmly established on the ground. It is difficult to accurately assemble an overall approach and also advance each technical field. Yet, we have to do just that. We must face this mission straightforwardly and work hard together so that the two structures will strengthen each other. I would like to believe that an approach with such a goal will lead to greater achievement in studies of "technology policy for land and infrastructure management."