

A Study on Seepage Failure resulting from Permeable Foundation Ground of Levee in Industry-University-Government Cooperation

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1. Introduction

In recent years, sand boil or slope slide due to infiltration have been causing damage to river levees such as failure and deformation. At present, however, there is no analysis technique that enables quantitative assessment of large-scale and progressive seepage failure or levee deformation that may result in levee failure, and absence of such technique is an issue in safety improvement.

NILIM is striving to solve the issues on the technical policy issues concerning the seepage failure of river levees with active use of advanced technologies in industries and universities through the system of public invitation for research and development. Under the 3-year plan starting in fiscal 2015, we have been endeavoring to solve the issues with the 3 subjects of study as shown in Figure 1.

2. Each subject of study

For Subject (1), study is proceeding mainly on survey techniques for grasping the ground conditions under which seepage failure is likely to occur. Specifically, examination of the survey method that interpolates machine drilling (technique to simply measure stratum structure and soil properties, such as surface wave survey), as well as field experiment, is going on, and the issue for the future is how to show the process of how to make individual survey methods available on the site.

For Subjects (2) and (3), study is proceeding mainly on the grasp of levee failure mechanism and the technique to risk assessment and analysis. As a result, we have found new knowledge through the model experiment, including classification of the relationship of the progress of seepage failure with water level and the soil layer pattern of permeable foundation ground. We are also clarifying the techniques to classify / organize the levee failure patterns due to infiltration. In the future, study is expected to proceed on clarification of the mechanism, development of risk assessment / analysis method, and reliability analysis, and application to practical operation is also expected.

3. Conclusion

Each study entered the final year of fiscal 2017 and study findings are becoming clearer. We are going to integrate the findings of individual studies and reflect them in through adjustment with the institutions concerned "Guide to River Levee Structure Survey," "Inspection Procedure for Levee and Other River Management Facilities and River Channels," etc. and to promote application to practical operation.

See the following for details.

- 1) Technical research and development on river erosion control <http://www.mlit.go.jp/river/gijutsu/kenkyu.html>
- 2) Video of the experiment by NILIM River Division <http://www.nilim.go.jp/lab/fbg/download/movie/movie.html>

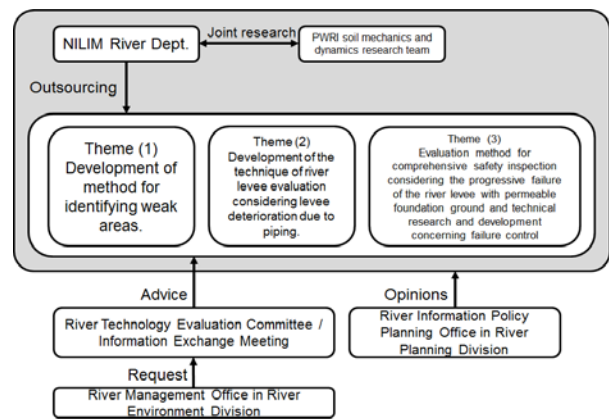


Figure 1: Public invitation system for technical research and development in the river engineering field

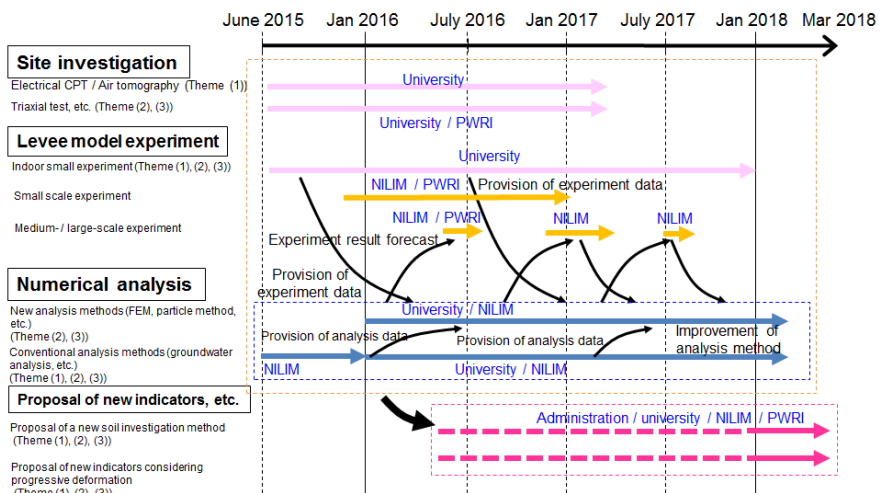


Figure 2: Efforts for individual issues