A Study for Development of Basic Technique to Visualize Flood Risk

(Study period: FY2015 to FY2018)

- Technological Study on Flood Risk Visualization Project -

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1. Introduction

NILIM launched the Flood Risk Visualization Project in order to address the issue of "last one mile" to use information on the river condition in case of a flood for evacuation behavior and crisis management. [1)] This project aims to expand the provision of information on water level from spot-specific river information of the gauging station to continuous river level, etc. along the upstream and downstream and to provide information that enables accurate grasp of when, where, and to what extent a flood may occur considering the relationships with profile water level, levee height, ground height, etc., and thereby to achieve more effective evacuation behavior and crisis management. This paper reports the progress of study on main issues, i.e., the technique to grasp / forecast at real time with high accuracy the profile water level, which changes constantly, and on how to indicate the risk of flood considering the relationships with water level, levee height, ground height, etc.

2. Study on the technique to grasp / forecast the state of profile water level

NILIM is proceeding with technological study on improvement of accuracy in flood forecast.[2)] We escalated the data assimilation technique cultivated by the study on flood forecast from one-spot data assimilation to multi-spot data assimilation, and developed the technique that contributes to the grasp of the state and forecast of profile water level. We confirmed that this technique contributes to improvement of the accuracy of grasping / forecasting the state of river level in similar sections of the river.

Note that this study has been conducted under the Cross-ministerial Strategic Innovation Promotion Program of the Council for Science, Technology and Innovation, titled "Enhancement of Societal Resiliency against Natural Disasters."

3. Establishment of prototype version of visualization system

We studied the indication method that contributes to the grasp of the risk of flood by overtopping considering the relationships between profile water level and levee height, and have built the "prototype version of visualization system" for the indication.

Figure indicates an example of the relationship of the difference between river level and levee crown height as the relationship between river level and levee height. In the Figure, two lines running along each side of the river represent the positions of the levees on the right and left sides and are classified by color according to the difference between water level and levee crown height. Thus, it has become possible to grasp at real time the relationship of levee height and water level, which changes constantly and grasp the spots with high risk of overtopping in bird's-eye view.

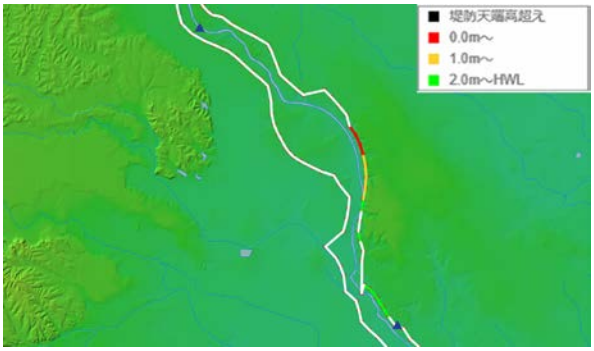

Figure: Example for indication of the risk of the flood with the visualization system

4. Future activity

For the technique to grasp / forecast the state of profile water level, we are going to further improve accuracy by upgrading the hydraulic model and improving the data assimilation technique. For the visualization system, we are going to reflect the viewpoints of sociology, information design, etc. and increase the display contents that enable the grasp of the risk of levee failure and consequent flood.

☞See the following for details.

1) 2016 NILIM Report, pp.79
http://www.nilim.go.jp/lab/bcg/siryou/2016report/ar2016hp048.pdf
2) 2015 NILIM Report, pp.53
http://www.nilim.go.jp/lab/bcg/siryou/2015report/ar2015hp033.pdf