Inundation Forecast for Reducing Urban Flood Damage

(Study period: FY2014 to FY2018)

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1. Introduction

In recent years, sudden torrential rains etc. have frequently caused a large amount of rainfall that exceeds the rainwater drainage capacity of cities and resulting flood disasters.

The purpose of this study is to establish an inundation forecast system covering the basins of Kanda River and Shakujii River, which can process inland and river floods data integrally and distribute the results of inundation forecast calculation with real time data for one hour ahead to the website or system users by alert mail when inundation depth exceeds a pre-set depth determined freely by users, within 10 minutes after receiving data, and to support flood damage prevention/ reduction activity, evacuation guidance, etc. by using the system, and thereby strengthen flood risk reduction measures.　Figure 1 shows the image of an alert mail and the system screen accessible from the mail.

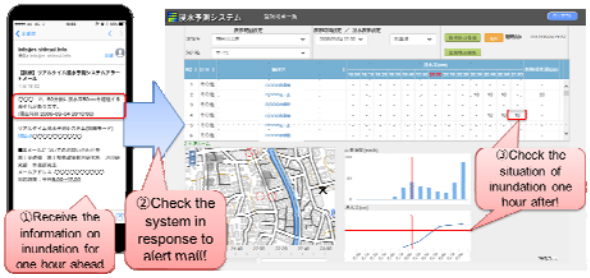

Figure 1: Alert mail and system screen image

2. Social experiment in the Kanda River basin

We surveyed availability of the system, matters to improve, etc. by investigating about 50 persons who were introduced from the local governments in the basin of the Kanda River (about 20 local residents, about 15 facility administrators, about 15 employees of local governments).　It was learnt from the survey that the content, volume, and accuracy of inundation forecast information required differ according to the positions of users and that few people used the system to check information after receiving an alert mail, while not a few people confirmed relevant information after receiving an alert mail.

3. Example of inundation forecast

On August 19, 2017, an area of social experiment was inundated by rainfall.　Figure 2 shows the rainfall (observed) and inundation depth (one-hour forecast value in every 10 minutes by numerical simulation based on forecast rainfall) in the area.　According to the information from residents and local government employees, the inundation time was around 17:00 and inundation depth was about 70-80 cm. On the other hand, the numerical simulation of inundation depth based on observed rainfall showed that the peak inundation depth in the area was 126 cm around 17:30. The alert mail was distributed at 16:02 to system users who had registered the area of inundation as a target area of the alert mail.　However, inundation depth forecast values based on rainfall forecast values tend to be larger than the numerical simulation values based on observed rainfall, which suggests that there is a problem with rainfall forecast accuracy.

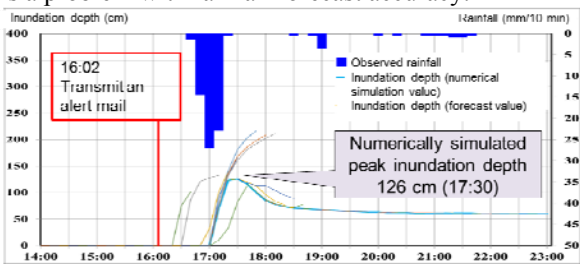

Figure 2: Example of inundation forecast

4. Future perspective

We intend to improve the accuracy of inundation depth forecast through data assimilation with the observation results of water level inside the sewage pipe, utilization of forecast rainfall data with a new type weather radar, etc. and continue to develop information distribution methods, system management methods, etc. for social implementation.

☞See the following for details.

1) Civil Engineering Journal Vol. 59, No.12, 2017, pp.18-21