Effective inundation countermeasures to prepare for the future increase of heavy rain

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(Key words) Increase of heavy rain, inundation countermeasure, unsteady flow model

1. Introduction

In recent years, heavy rain of 50mm/hr or more has fallen frequently in various parts of Japan[1)]. Measures to prevent disastrous inundation are being taken by local governments, but it is considered possible that in the long term, as a result of change of the rainfall characteristics, present inundation countermeasures alone might be unable to handle heavy rain with 5-year probability or 10-year probability. So the NILIM is conducting studies to clarify future heavy rain increase trends and countermeasures to deal with this increase, and abstracting problems related to the enactment of rainfall countermeasure plans and studying improvement measures.

2. Studying countermeasures to deal with the increase of heavy rain

We used annual maximum rainfall intensities from 1960 to 2009 at 57 meteorological observatories nationwide to predict the increase rate of 10-minute/60-minute rainfall intensity with 5-year/10-year probability during the next fifty years in each observatory. The results showed a trend for 10-minute/60-minute rainfall intensity with 5-year/10-year probability nationwide to rise to a maximum of between 1.3 and 1.4 times the present levels (95 percentile values) fifty years in the future. Based on this, inundation simulations were performed for three districts to evaluate the impact on existing inundation countermeasures of the future increase of heavy rain, revealing a case where it is predicted that the area inundated to a depth of 20cm or more will increase between 4% and 9%. The results also suggest that in a case where the rainfall drainage capacity is insufficient over a wide area, or in a case where local inundation is caused by the drainage capacity of a branch channel, it will be necessary to take countermeasures appropriate considering the cause of inundation in each district.

In the future, we will universally evaluate the impact that the increase of heavy rain will have on inundation countermeasures to suggest specific measures according to the characteristics of inundation.

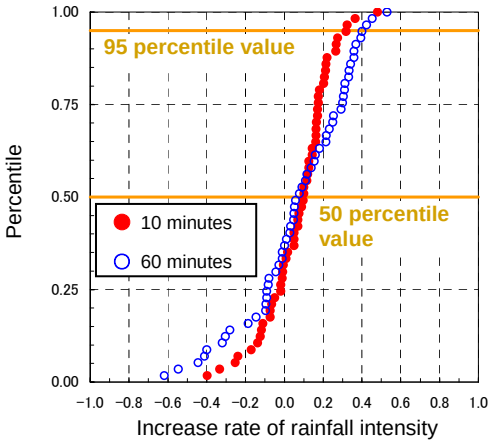

Figure 1. Distribution of Increase Rate of 10-minute/60-minute Rainfall Intensity at 57 Observatories Nationwide (5-year probability)

3. Survey of rainfall countermeasure plan enactment methods

In order to deal with the future increase of heavy rain, it is becoming increasingly important to efficiently enact rainfall countermeasure plans by combining several inundation countermeasures using an unsteady flow model. But in many cases, because objective judgment standards for setting the scale of countermeasure facilities have not been generally introduced, an unsteady flow model is only used as an evaluation tool to discover operation methods and temporary countermeasures for facilities designed applying previously used rational formulas.

Based on this situation, we collected information about cases of the enactment of rainfall countermeasure plans for about 20 cities nationwide, and are now abstracting problems with rainfall countermeasure plan enactment methods and studying improvement measures.

[Reference]
1) Ministry of Land, Infrastructure, Transport and Tourism, Sewerage and Wastewater Management Department website
(http:/www.mlit.go.jp/mizukokudo/sewerage/crd_sewerage_tk_000117.html)