Advanced estimation of CSO occurrence and overflow volume from outfall chambers and pumping stations in Tokyo

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ABSTRACT

To estimate the occurrence of CSO from outfall chambers and pumping stations, runoff model simulation was calibrated. Then calibrated model was applied to eight drainage areas within the whole Tokyo 23 wards. The results of simulation at rainfall event on 10-11 November, 2007, showed that CSO volumes of 1.68 and 1.29 million m^3 were discharged from 480 outfall chambers and 15 pumping stations, respectively. Since the overflow from outfall chambers constitutes about 57% of the whole CSO, it suggested that outfall chambers are non-negligible for CSO control as well as pumping stations. The runoff simulation results showed that CSO volume in three drainage areas accounted for 70-75% of the total volume from outfall chambers under spatially-uniform rainfall conditions with three different characteristics. The ratio of the specific volume of CSO from outfall chambers per unit drainage area to the total rainfall height means the overflow fraction to the total rainfall. The highest ratios were estimated at 20-28% for three different events in Shakujii river drainage area, which means that one fourth to one fifth of rainfall is discharged through outfall chambers to receiving water.

KEYWORDS

Combined sewer overflow, outfall chamber, pumping station, distributed model