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Evaluation Method for topographical and Geographical Characteristics of Flooded Areas

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In Tokyo Metropolis, inland flooding has caused much damage. Recently, many local-scale floods have been induced repetitively by torrential downpours. Thus, we focused on topographical and geographical characteristics of the flooded areas. In this study, we analyzed topographical and geographical characteristics of flooded areas in Shinjuku, Toshima and Bunkyo wards and visualized potential for inland flooding in these wards. In these wards, inland flooding has occurred frequently and repeatedly in recent years.

According to the records of flooding that were compiled by Tokyo Metropolitan Government, there were 107 inundations between 1989 and 2009 in the study area. We classified these flooded areas into three groups: lowland type, upland type and valley on upland type, and extracted topographical and geographical parameters of flooded areas by using ArcGIS10, 5-m DEM and 1:2500 Digital map of Tokyo. We extracted 12 parameters: depression depth, depression volume, catchment area, land coverage of catchment area, mean slope of catchment, mean slope from a flooded area to a discharge point of catchment, difference between these two slopes, length from upper most of catchment to a flooded area, length from a flooded area to a discharge point of catchment, difference between these two lengths, valley depth, valley width. These parameters were examined by principal component analysis (PCA) to evaluate topographical and geographical characteristics of the flooded areas and extracted the areas that have potential for inland flooding.

Keywords: inland flooding, GIS, topographical and geographical characteristics, principal component analysis