

Assessment of areas at risk of inside water inundation by topographical and geographical characteristics

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In Tokyo, various countermeasures to inside water inundation are proceeding. However, some areas where floods occur repetitively or small-scale floods occur are identified. Thus, it is necessary to understand topography or land cover of these areas. In Shinjuku, Toshima and Bunkyo, inside water inundation occurs frequently and some areas where floods occur repetitively are found. Therefore, in this study, we analyzed topographical and geographical characteristics of inundation records in these three districts and assess areas at risk of inside water inundation.

Inundation records in study area were 107 in 1989 -2008. We classified of these flood areas into 3 groups, those occurred in lowland, upland and valley on upland. The properties that were extracted as those involved in topographical or geographical characteristics of the flood areas were depression depth, depression volume, catchment, land cover of catchment, mean slope of catchment, mean slope from a flood area to a catchment exit, difference between these two slopes (slope difference), length from upper most of catchment to a flood area, length from a flood area to a catchment exit, difference between these two lengths (length difference), valley depth, valley width. We used ArcGIS10 to extract these all properties. Those properties were examined by principle component analysis (PCA) to assess topographical and geographical characteristics of the flood areas, resulting in two major components in lowland, three major components in upland and four major components in valley on upland.

The first PC in lowland, upland and valley represented the size of catchment, and length difference and the higher the PCA score, the larger catchment, and length difference. In the first PC in lowland also represented the size of depression. The second PC in upland, valley and the fourth PC in valley showed the size of depression. In the second PC in lowland and the third PC in upland and valley, the higher the PCA score, the larger mean slope of catchment, slope difference.

We calculated these PCA scores in the flood areas and all study area. Then areas over the minimum all PCA scores of the flood areas were extracted from the study area as the ones at risk of inside water inundation.

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