

Spatial Analysis of Flood Vulnerability in Highly Urbanized Area: A Case Study in Taipei City

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Abstract : Without adequate information and mitigation plan for natural disaster, the risk to urban populated areas will increase in the future as populations grow, especially in Taiwan. Taiwan is recognized as the world's high-risk areas, where an average of 5.7 times of floods occur per year should seek to strengthen coherence and consensus in how cities can plan for flood and climate change. Therefore, this study aims at understanding the vulnerability to flooding in Taipei city, Taiwan, by creating indicators and calculating the vulnerability of each study units. The indicators were grouped into sensitivity and adaptive capacity based on the definition of vulnerability of Intergovernmental Panel on Climate Change. The indicators were weighted by using Principal Component Analysis. However, current researches were based on the assumption that the composition and influence of the indicators were the same in different areas. This disregarded spatial correlation that might result in inaccurate explanation on local vulnerability. The study used Geographically Weighted Principal Component Analysis by adding geographic weighting matrix as weighting to get the different main flood impact characteristic in different areas. Cross Validation Method and Akaike Information Criterion were used to decide bandwidth and Gaussian Pattern as the bandwidth weight scheme. The ultimate outcome can be used for the reduction of damage potential by integrating the outputs into local mitigation plan and urban planning.

Keywords : flood vulnerability, geographically weighted principal components analysis, GWPCA, highly urbanized area, spatial correlation

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