District flood vulnerability index: urban decision-making tool

ABSTRACT

Flood vulnerability assessment as an essential part of the urban flood management is done by various methods by several researchers. In fact, the improvement in assessment methods is related to the necessity for enhanced decision-making procedures; for instance, economic or infrastructural investments in cities can be assigned in the best form. To achieve this aim, introducing indices for evaluating vulnerability and identifying more vulnerable zones and then doing relevant comparisons can be useful. District flood vulnerability index (DFVI) developed by the author uses 25 indicators in its calculation. Nevertheless, it is obvious that some of these indicators have no effect on the consequences. This paper presents the results of the analysis for the selection of the most significant indicators of the DFVI construction. This index is appropriate for urban district scaling (or: the urban district scale) and the various components of flood vulnerability (social, economic, environmental and physical). DFVI was made by analyzing the indicators' relevance and by studying the main indicators needed to depict reality of the urban district floods in an effective way. For this purpose, expert elicitation was done by Delphi and AHP method in two separate phases. Then, all these results were combined in order to construct DFVI equations. Finally, the index was implemented in Kuala Lumpur city's districts. This paper outlines which district of cities (in this case Kuala Lumpur) are most vulnerable to flood hazard with regard to the system's components, that is, social, physical, environmental and economic.

Keyword: Vulnerability assessment; Flood vulnerability index; Fuzzy Delphi; AHP method; Urban district scale