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Assessment of Green Infrastructure for Sustainable Urban Water Management

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Abstract : Green infrastructure (GI) offers a contemporary approach for reducing the risk of flooding, improve water quality, and harvesting stormwater for sustainable use. GI promotes landscape planning to enhance sustainable development and urban resilience. However, the existing literature is lacking in ensuring the comprehensive assessment of GI performance in terms of ecosystem function and services for social, ecological, and economical system resilience. We propose a robust indicator set and fuzzy comprehensive evaluation (FCE) for quantitative and qualitative analysis for sustainable water management to assess the capacity of urban resilience. Green infrastructure in urban resilience water management system (GIUR-WMS) supports decision-making for GI planning through scenario comparisons with urban resilience capacity index. To demonstrate the GIUR-WMS, we develop five scenarios for five sectors of Chandigarh (12, 26, 14, 17, and 34) to test common type of GI (rain barrel, rain gardens, detention basins, porous pavements, and open spaces). The result shows the open spaces achieve the highest green infrastructure urban resilience index of 4.22/5. To implement the open space scenario in urban sites, suitable vacant can be converted to green spaces (example: forest, low impact recreation areas, and detention basins) GIUR-WMS is easy to replicate, customize and apply to cities of different sizes to assess environmental, social and ecological dimensions.

Keywords : green infrastructure, assessment, urban resilience, water management system, fuzzy comprehensive evaluation
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