Measuring Urban Green Space Potential Satisfaction Using GIS and Remote Sensing: A Case Study of Surabaya, Indonesia

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Urban green space (UGS) is an important part of the sustainable urban ecosystem. Loss of UGS adversely affects the environment and climate in general. Thus, the quantity and quality of UGS are prime concerns in urban planning and policy. The new paradigm of "green health" to achieve environmental benefits has gained a great concern owing to the increasing availability of Geographical Information System (GIS) and Remote Sensing, which enable the objective measurement of UGS indicators. Here, the evaluation of UGS in the neighborhood level should be conducted to promote the green environment. Urban areas with high residential occupancy should provide greater access to UGS to address neighborhood satisfaction. The purpose of this study was to develop the Potential Satisfaction Green Index (PSGI), for measuring the degree of potential satisfaction with UGS at the neighborhood level. The study focused on active UGS, such as gardens and parks. The PSGI consisted of three parameters: area of UGS, proximity of built-up pixels to UGS, and built-up volume, measured using GIS and Remote Sensing data. A neighborhood buffer was defined to address the accessibility. The mean and the highest PSGI measured were 0.209 and 1,860.34, respectively, for existing UGS. In order to increase levels of potential satisfaction, new UGS sites were introduced. Bareland and grassland sites were chosen for new UGS. The mean and the highest PSGI increased significantly to 2.105 and 9,985.72, respectively, when the new UGS sites were applied. However, 2% of built-up pixels had a PSGI value of zero, indicating no access to any UGS. The PSGI for all villages in the study area was also evaluated. Two villages, Tembok Dukuh and Simolawang, had very low PSGI due to the high building congestion, making it difficult to find potential sites for new UGS. Using the three parameters, the index provided an acceptable approach for preliminary assessment of potential satisfaction with UGS at the neighborhood level. Thus, this method is recommended to urban planners to support the development of a green city.

Keywords: Urban Green Space (UGS), Potential Satisfaction Green Index (PSGI), Geographical Information System (GIS), Remote Sensing, Surabaya

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Abstract

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