

Spatiotemporal analysis of urban land changes in the major cities of Southeast Asia

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(1) Purpose: The main purpose of this study is to examine and compare the intensity and spatial pattern of urban land changes (ULCs), i.e. the changes from non-built up lands to built-up lands, in three major cities of Southeast Asia, namely Bangkok, Jakarta and Manila, between the 1990s (1990-2000) and 2000s (2000-2010).

(2) Data and methods: To prepare the land-use/cover maps of the study areas (Figs. 1-3), we used Landsat imageries captured around the 1990 (t1), 2000 (t2) and 2010 (t3) time points.

For the ULC intensity analysis, we calculated the annual change intensity for each time interval (e.g. t1-t2, t2-t3) and the uniform intensity across the whole time extent (i.e. t1-t3). In order to determine the intensity or rate of ULC across the time intervals, we compared the annual change intensity with the uniform intensity. To characterize the intensity of ULC, we propose six category levels, namely very slow, slow, medium slow, medium fast, fast and very fast.

For the ULC spatial pattern analysis, we derived the density of urban development along the gradient of the distance from city center in each city. We also calculated the patch cohesion index to determine the

level of aggregation or physical connectedness of built-up lands in the three cities based on the extent of their respective land-use/cover maps.

(3) Results and Discussion: The results revealed that the intensity of ULC in Bangkok was ‘medium slow’ during the 1990s and ‘medium fast’ during the 2000s. For Jakarta, it was ‘medium fast’ in the 1990s and ‘slow’ in the 2000s. For Manila, it was also ‘medium fast’ during the 1990s and ‘medium slow’ during the 2000s.

In all the three cities, the density of urban development along the gradient of the distance from city center showed a pattern similar to Newling’s model of urban population density (Newling 1969). The results also showed some evidence that the built-up lands of Manila were relatively more aggregated or physically connected than those of Bangkok, but more especially those of Jakarta.

(4) Reference:

1) Newling, B. 1969. The spatial variation of urban population densities. *Geographical Review*, **59**, 242–252.

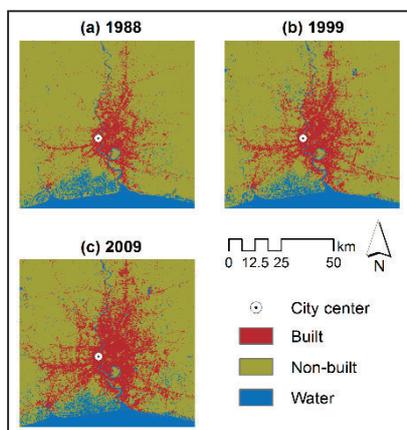


Fig. 1: Land-use/cover maps of Bangkok, Thailand.

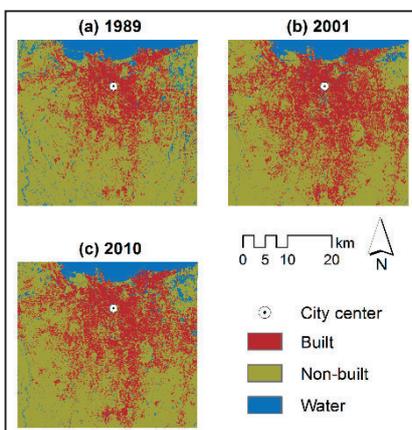


Fig. 2: Land-use/cover maps of Jakarta, Indonesia.

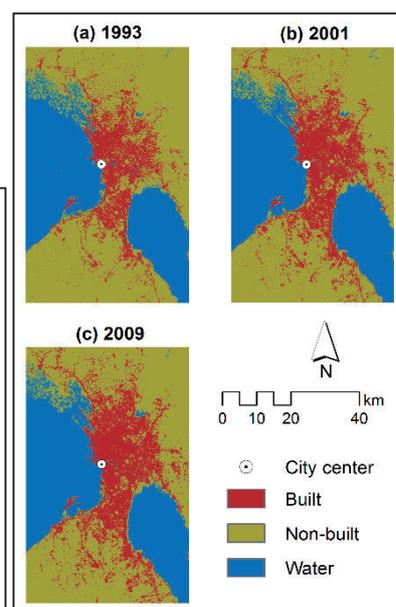


Fig. 3: Land-use/cover maps of Manila, Philippines.