Spatiotemporal analysis of land use /cover changes and urban expansion in Lusaka City, Zambia

Matamyo SIMWANDA

Division of Spatial Information Science, Faculty of Life and Environmental Sciences, University of Tsukuba

Contact address: <matamyo@gmail.com>

D02

CSIS Days 2015

Introduction

Lusaka, the capital city of Zambia, has been experiencing rapid urban growth. Rapid urbanization has caused rapid Land use/over (LULC) changes. The purpose of this study was to investigate the spatiotemporal pattern and processes LULC changes and urban expansion in Lusaka City, Zambia.

Methodology

LULC Classification

- Data - Landsat TM & ETM+; Period - 1990, 2000, 2010; Method - Maximum Likelihood Classification; Software - ENVI 5.2.

Landscape Change Dynamics

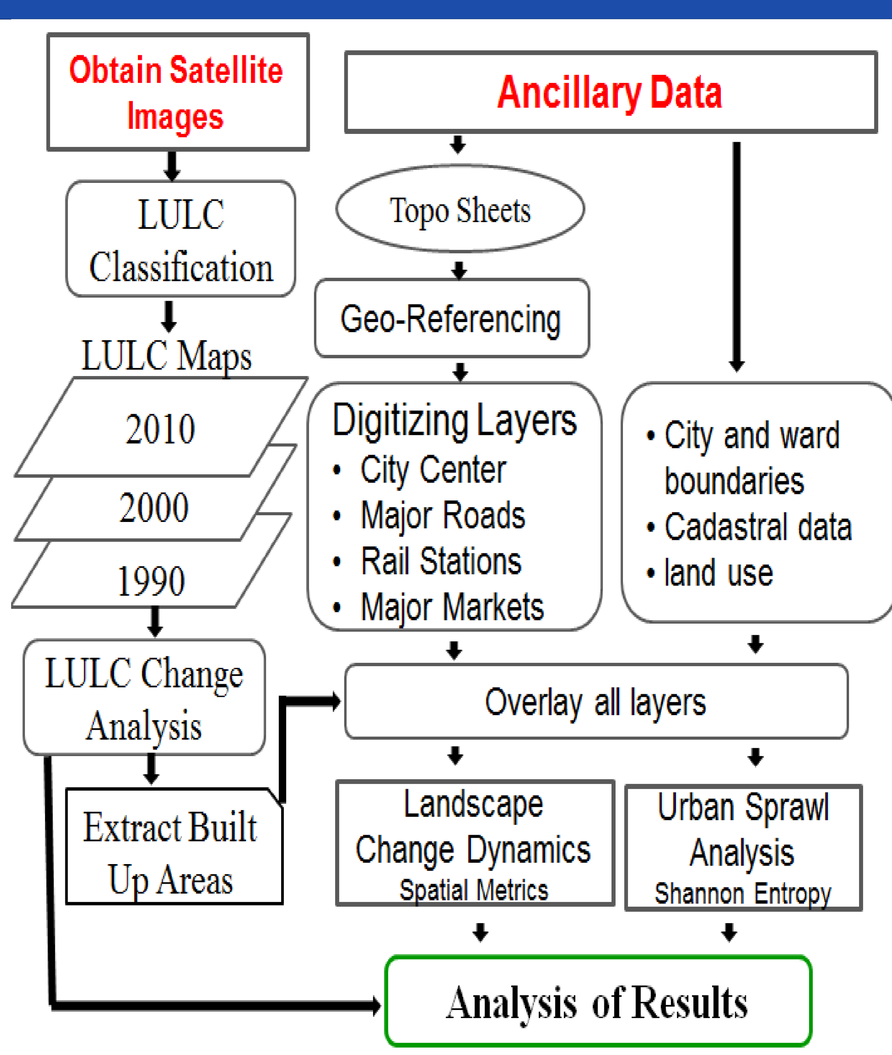
- Selected landscape level spatial metrics generated in FRAGSTATS. (*LPI- Largest Patch Index; PD - Patch Density; MPS - Mean Patch Size; LSI - Landscape Shape Index; IJI - Interspersion and Juxtaposition Index; AWMPFD - Area Weighted Mean Patch Fractal Dimension); CONTAG - Contagion ; COHESION)*

Urban Sprawl Analysis

- *Method* - Shannon Entropy(Hn) which measures the compactness or dispersion of urban/built up area.
- Equation: $H_n = -\sum_{i=1}^{n} P_i \log(1/P_i)$ - where Pi is the proportion of the variable (e.g. built up area) in the *ith* zone. Hn values range from 0 to log n; values closer to 0 representing compactness and values closer to log n representing dispersion.
- Sprawl reference zones

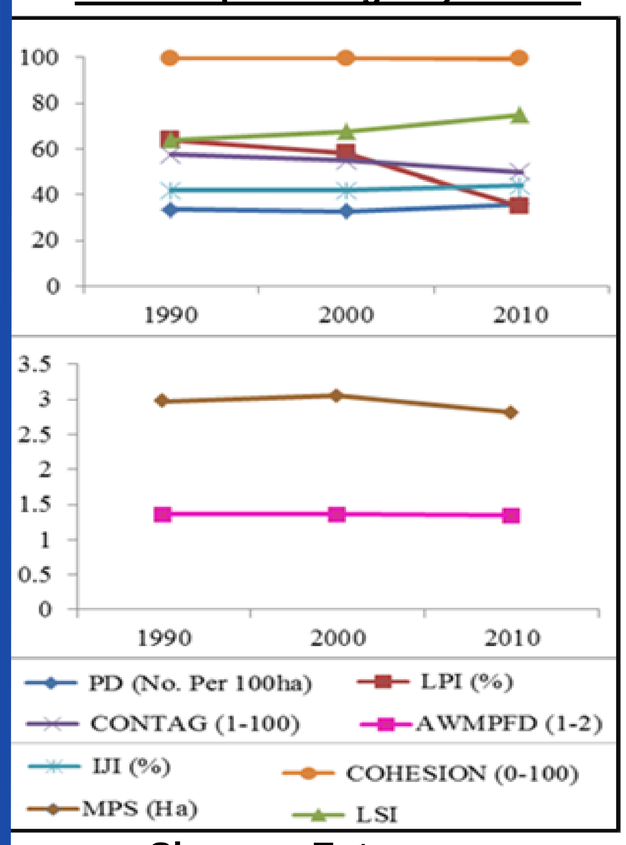
(1) Ward Groups (WGs) - grouped based on built area composition.

(2) Distance to Location Factors: city center, major roads, major markets and rail station.

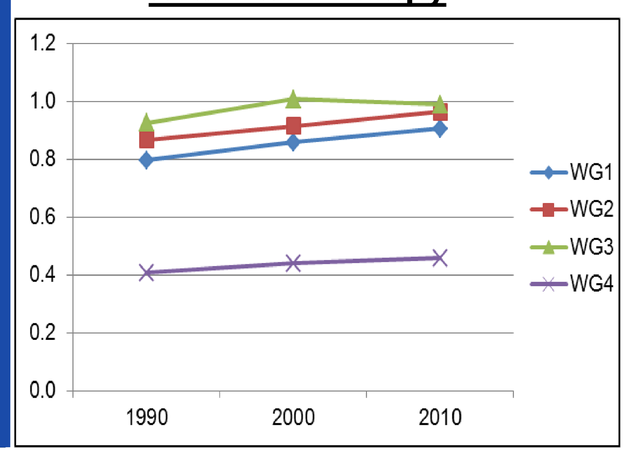


Results

Landscape Change Dynamics

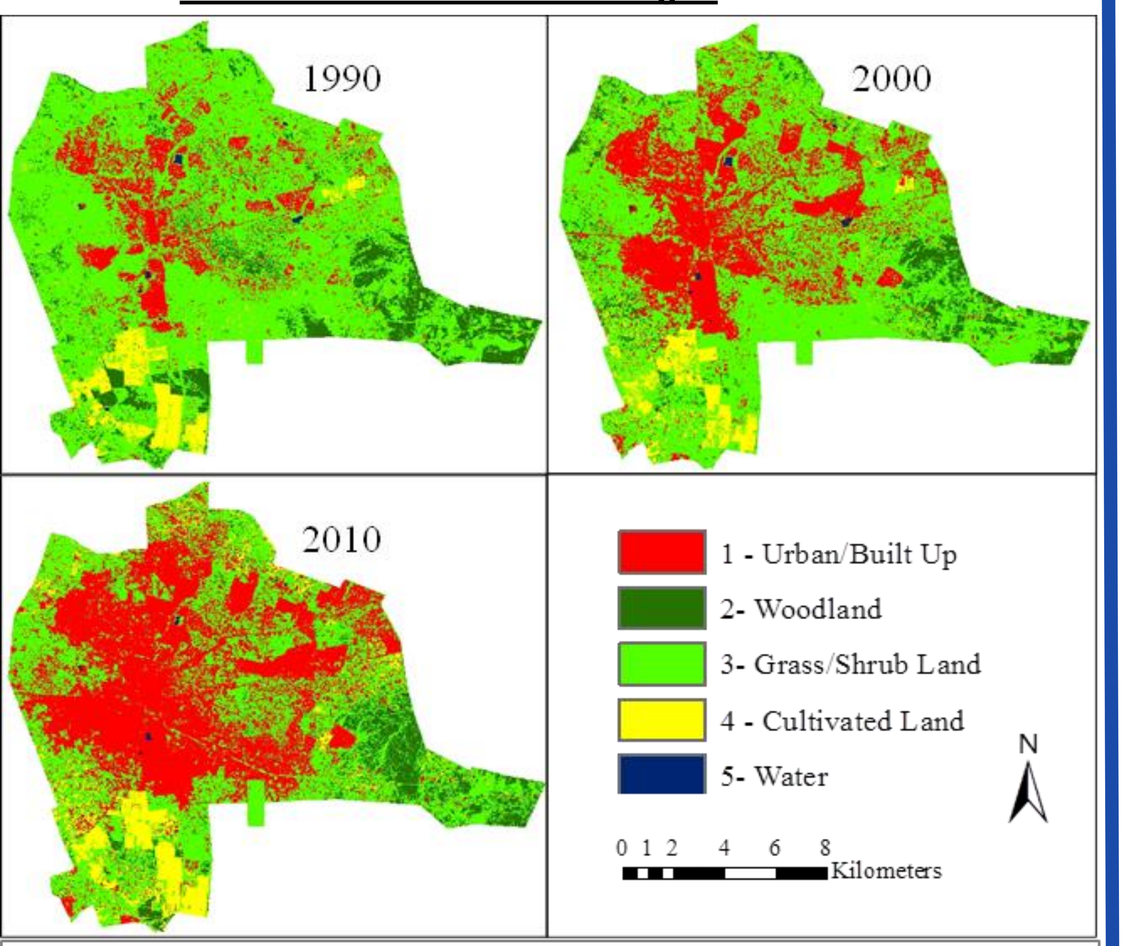


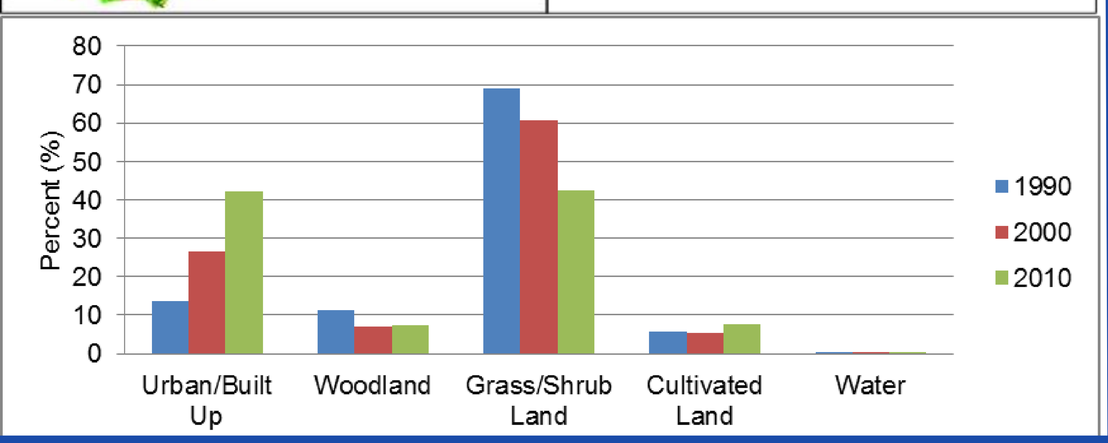
Shannon Entropy



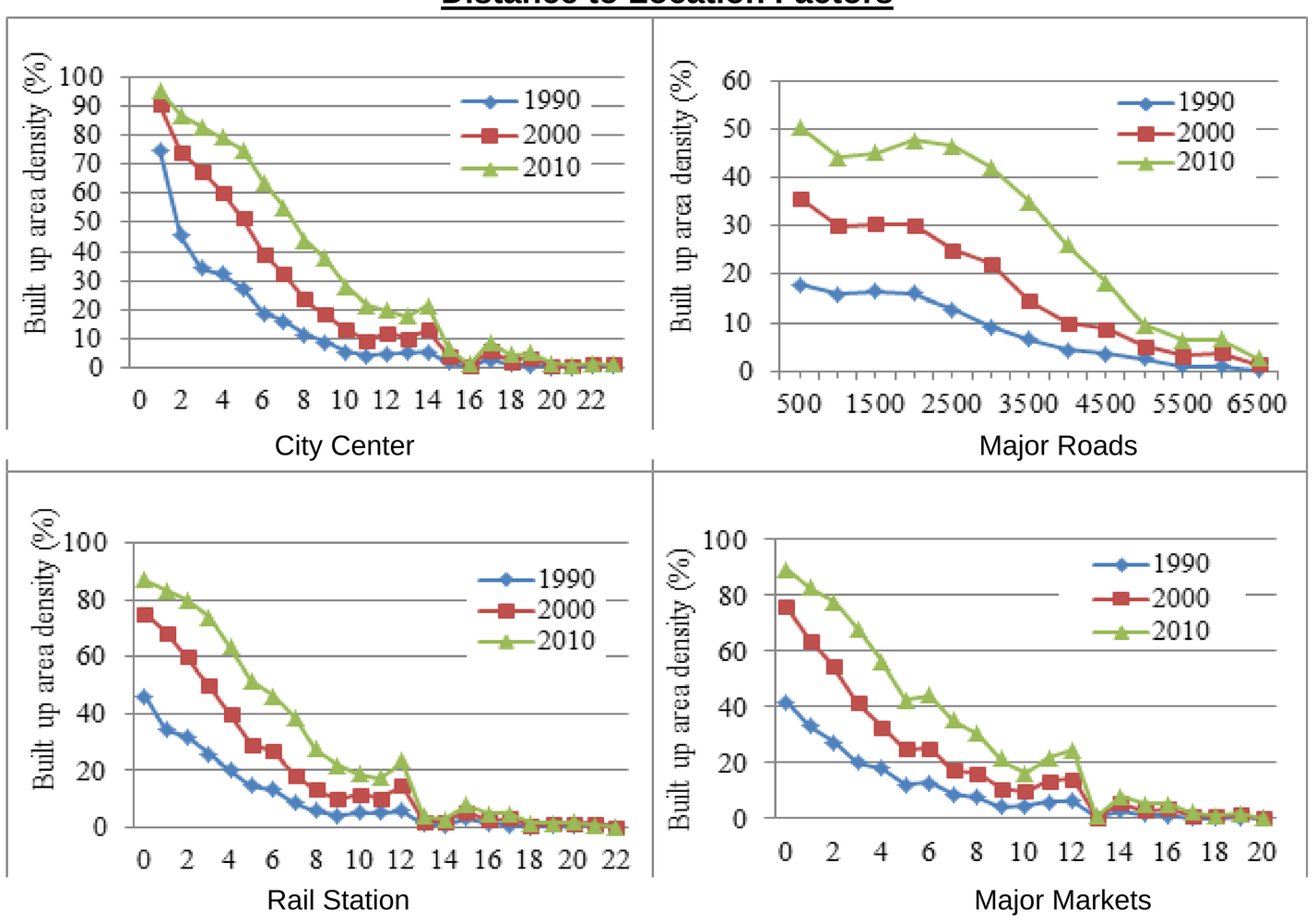
Results

Land Use /Land Cover Changes





Distance to Location Factors



Conclusion

- Built Up area increasing at rapid rate dominated by unplanned areas.
- Landscape fragmentation increasing and becoming more heterogeneous.
- Entropy shows increased and continued dispersion of the landscape – urban sprawl evident.