Gradient Analysis of Urban Landscape Pattern
(Case Study from Isfahan City)

Soffianian A. [*]

Assistant Prof., Dep. of Natural Resources, Technology University of Isfahan

Mokhtari Z.

M.A. in Environmental Science, Dep. of Natural Resources, Technology University of Isfahan

Khajeddin S. J.

Associate Prof., Dep. of Natural Resources, Technology University of Isfahan

Ziaei H.R.

M.A. in Remote Sensing and GIS, Shahid Chamran University, Ahvaz

Extended Abstract

Introduction

Urban landscape is a heterogeneous mosaic of physical and biological patches. Quantifying landscape pattern and it's change is essential for monitoring and assessment of ecological consequences of urbanization. The recent related research has been greatly promoted by the easier availability of higher resolution remote sensing data and the development of GIS and geospatial techniques, as well as other disciplines such as landscape ecology. The convergence of GIS, remote sensing and other related disciplines has helped in quantifying, monitoring, modeling and subsequently predicting the urban land use development. many landscape metrics have been developed and widely applied for characterizing various landscape patterns in the past few decades. Gradient analysis has been used to detect the urbanization gradient of landscape pattern. In this research combining gradient analysis with landscape metrics, were used for analyzing of landscape pattern.

Methodology

To achieve this aim, land use map of Isfahan city was generated in 6 classes: urban, green

[*]E-mail: Soffianian@cc.iut.ir   Tel: 0311-3913566

spaces, agricultural lands, bare lands, road and water. For gradient analysis two transect from north to south and east to west were conducted across the city. Then appropriate metrics was selected to doing analysis. These metrics consists Percent coverage, patch density, edge density, largest patch index, mean patch size, mean shape index and area weighted mean patch shape index. Landscape metrics were computed along the transects with a moving window technique. These windows are in 3×3 kilometers with a one kilometer overlapping.

The application of moving window method could examine the land use change process and link pattern and process easily in the local area.

Results and Discussion

Most of the land of Isfahan was urban land uses occupying 45 per cent of the area, while agricultural land uses was the second most of lands. The mean patch size (MPS) in bare lands was the most.

The maximum value of PLAND, patch density and largest patch index metrics assigned to the agricultural class. And the mean patch size of bare class is the maximum value.

In general the results showed that mean patch size is higher in margins than in median blocks and inverse patch density and edge density in median are more than in margins. These results showed not only the land use has been changed but also the shape and density of patches has been changed. The trend of these changes are differ from each other in two transects. Some of similar researchs have the same results. The density of patch and edge has an increasing with the urban developing in both transects. The trend of changes in transects are different from each others. This trend is more symmetric in east-west gradient than the north-south one. Also this research demonstrate that transect is an appropriate tool for studying of gradients in urban regions.

Conclusion

Spatial pattern of urbanization could be quantified using landscape metrics with a gradient analysisapproach. In transects not only the land uses percentage has changed but also the shape and density of the different land use changed.

The changes in landscape pattern along the transect have important ecological implications, and quantifying the urbanization gradient, as illustrated in this paper, is an important first step to linking pattern with processes in urban ecological studies.

Keywords: Gradient Analysis, Landscape Metrics, Moving Window and Isfahan City.