A Comparison of Simulated Annealing (SA) and Multi Objective Land Allocation (MOLA) for Solving the Problem of Multi-Objective Land Allocation

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Abstract

The goal of multi-objective land use assessment and allocation (MOLAA) is provision of an optimal allocation of all land uses with maximum suitability. Different techniques of multiple criteria decision making have proven useful as decision support tool for solving a MOLAA problem. SA and MOLA are two different MCDM approaches that can provide solution to a MOLAA problem using different decision rules. This paper aims to provide an informed choice about these methods by comparing their performance in optimal allocation of study area to four land uses including agriculture, forestry, rangeland and development. Visual interpretation of the results showed that SA maximized overall land use suitability with better spatial compactness than MOLA.

At the land use level, except for agricultural lands, MOLA allocated more suitable land units to development, forestry and rangeland than SA. Considering results in terms of landscape patterns by FRAGSTATS software, we found that SA has produced better land use patterns with higher spatial compactness than MOLA. The main problem of MOLA is insufficient attention to compactness factor that results in spreading of pixels in final map.

Keywords: Golestan province, Multi criteria decision making, Optimization, Algorithm.

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