

Approaching the Spatial Multi-Objective Land Use Planning Problems at Mountain Areas by a Hybrid Meta-Heuristic Optimization Technique

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Abstract : The mountains are amongst the most fragile environments in the world. The world's mountain areas cover 24% of the Earth's land surface and are home to 12% of the global population. A further 14% of the global population is estimated to live in the vicinity of their surrounding areas. As urbanization continues to increase in the world, the mountains are also key centers for recreation and tourism; their attraction is often heightened by their remarkably high levels of biodiversity. Due to the fact that the features in mountain areas vary spatially (development degree, human geography, socio-economic reality, relations of dependency and interaction with other areas-regions), the spatial planning on these areas consists of a crucial process for preserving the natural, cultural and human environment and consists of one of the major processes of an integrated spatial policy. This research has been focused on the spatial decision problem of land use allocation optimization which is an ordinary planning problem on the mountain areas. It is a matter of fact that such decisions must be made not only on what to do, how much to do, but also on where to do, adding a whole extra class of decision variables to the problem when combined with the consideration of spatial optimization. The utility of optimization as a normative tool for spatial problem is widely recognized. However, it is very difficult for planners to quantify the weights of the objectives especially when these are related to mountain areas. Furthermore, the land use allocation optimization problems at mountain areas must be addressed not only by taking into account the general development objectives but also the spatial objectives (e.g. compactness, compatibility and accessibility, etc). Therefore, the main research's objective was to approach the land use allocation problem by utilizing a hybrid meta-heuristic optimization technique tailored to the mountain areas' spatial characteristics. The results indicates that the proposed methodological approach is very promising and useful for both generating land use alternatives for further consideration in land use allocation decision-making and supporting spatial management plans at mountain areas.

Keywords : multiobjective land use allocation, mountain areas, spatial planning, spatial decision making, meta-heuristic methods

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