Spatial Optimization and Land Use Allocation Based on Carrying Capacity Using Cellular Automata

Sitarani Safitri (1), Irawan Sumarto (1), Akhmad Riqqi (1), Albertus Deliar (1)

[1] Inst. Tech. of Bandung, Jalan Ganesha No.10, Lb. Siliwangi, Coblong, Bandung, 40132, Indonesia
Email: sitaranisafitri@gmail.com; irawansumarto@gmail.com; akhmad.riqqi@gmail.com; albertus.deliar@gmail.com

Abstract: Land can produce products in the form of goods and services (supply) to meet human needs (demand). Meeting human needs through development activities requires the allocation of land cover/land use. Land cover/land use should be allocated with regard to the land capability itself. The ability of land to meet human needs without permanently damaging the environment is known as environmental carrying capacity – *Daya Dukung Lingkungan Hidup* (DDLH). Based on existing developments, ecological footprint (EF) becomes a simple but comprehensive carrying capacity assessment method. Therefore, this study used EF for the calculation of land cover/land use allocation based on DDLH. The next question is how to find location directions from the allocation of land cover/land use that has been determined. This can be achieved by having information on the relationship between the land characteristics. The inefficiency of land cover/land use pattern is also one of the main issues in determining the location of land cover/land use allocation. In this paper, we present a spatial optimization model using Cellular Automata (CA), which minimizes the conflicting objectives of open space development, infill and redevelopment, land use neighborhood compatibility, and cost distance to already urbanized areas. The result of this research would be helpful for enhancing involvement in and impact on research in sustainable development planning.

Keywords: carrying capacity, ecological footprint, land use allocation, spatial optimization, cellular automata.