Building a Cellular Automata Model for Land–Use Change Simulation Using Cadastral Data – a Case Study in Northern Greece

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Key words: Cadastre; Geoinformation/GI; Land management; Spatial planning;

SUMMARY

The quality and plethora of recent geospatial and geo-referenced descriptive data has revealed new potentials for building fine scale land-use (LU) change simulation models. Cellular Automata (CA) Theory has largely assisted in creating such models where the transition potential for land-use change can be expressed through simply stated mathematical rules. More specifically, Cellular Automata geo-simulation models require the definition of a spatial unit (e.g a cell or a parcel), a set of specific land-uses which each unit can take at any given time step, a time frame in which the model will be calibrated and validated, and a set of land-use change driving factors, the analysis of which will lead to the extraction of the mathematical transition rules. Cadastral Data provide a high scale framework for the calibration of the model, where the network of cadastral parcels gives a realistic representation of the boundaries in which land-use change is expected to take place and the descriptive cadastral database provides additional information on the owners, the property rights, the existing land-uses as well as information on the constructions that are currently located in each parcel. In addition, Rough Set Theory has proved to be a valuable tool for the analysis of the influence of each recorded change driving factor in an effort to extract realistic transition rules that can simulate the interactions that eventually lead to land-use change. A case study in Northern Greece has revealed the advantages and strong points of adapting such a model in an urban and peri-urban spatial planning context in order to design viable and sustainable cities.