



Suzana Dragičević

# Computational Intelligence and Land-Use Change Modeling

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The increasing pressure from human activities on the physical and natural environment impacts the urban land-use change process and directly contributes to degradation of the natural landscape. Activities such as urbanization, industrial development, excessive agriculture and deforestation are associated with urban sprawl that have adverse effects on the environment and contribute to global climate and environmental changes. It is estimated that the majority of the world population will live in urban areas in just a few decades. Urban land-use processes are driven by complex social interactions between the multiple actors. These drivers are characterized by competition for space, economic benefits, governmental interests and sometimes sustainability goals. The design, development and integration of spatial modeling and simulation approaches provide insightful and innovative ways to address this challenge for improved management and policy strategies. The main objective of this research is to build a series of land-use change simulation models that represent and characterize these dynamic spatial processes for better understanding, analysis and forecasting. Multiple approaches based on computational intelligence such as soft computing and Bayesian Networks were used, and combined with GIS and complex systems, to generate scenarios closer to reality at the rural-urban interface. More particularly, enhanced cellular automata and agent-based models that were developed for Metro Vancouver Region, Canada and in the context of North American cities will be presented. The developed models and generated land-use change patterns with different future outcome scenarios can provide useful information for decision and policy-making to mitigate adverse environmental consequences.

**Suzana Dragičević** is a Professor in the Department of Geography, Simon Fraser University (SFU), Canada. She has acquired over 20 years of academic experience focusing on geographic information systems and science, more particularly in the emerging areas of geocomputation and geosimulations. Her main research work deals with the integration of complexity science, GIS and computational intelligence for the analysis and modeling of complex dynamic geographical systems. Application areas include land-use/land-cover change, urban growth, forestry, landscape ecology and epidemiology. In 2001 Dr. Dragičević established the Spatial Analysis and Modeling (SAM) Research Laboratory at SFU where her research program is conducted. She has published over 70 peer-reviewed papers and book chapters, conference papers, encyclopedia entries, journal editorials and book reviews. She co-edited the books *Collaborative GIS* (Idea Group Inc., 2006) and *Advances in Web-based GIS, Mapping Services and Applications* (CRC Press, 2011). In addition, Dr. Dragičević is co-editor of the Springer book series on *Advances in Geographic Information Science*; associate editor for the *Landscape and Urban Planning* journal; associate editor for *Modeling and Decisions Support Systems* of *Geomatica* journal; member of numerous international journal editorial boards and international conference program committees.