Modeling Urban Change and Its Implications for Ecosystem Management

Bio:
Abdolrassoul Salmanmahiny, also known as Rassoul Mahiny, was born in Tehran, Iran, in 1966. He earned his B.Sc. in Fisheries and Environmental Science from Gorgan University in 1989, followed by an M.Sc. in Environmental Science from Tehran University in 1994. Dr. Mahiny completed his Ph.D. in Resource Management and Environmental Science at The Australian National University, Canberra, Australia, in 2004. He conducted sabbatical studies at the Geography Department, UCSB, Santa Barbara, California, USA, from February to August 2010 and at the same time worked as research associate at UCSB. He has served as an academic staff member at Gorgan University of Agricultural Sciences and Natural Resources since 1994. Dr. Mahiny has taught a variety of courses at both the B.Sc., M.Sc. and PhD. levels, in areas such as basic and advanced remote sensing, GIS, land evaluation and land use planning, environmental impact assessment, and climate change impact assessment. Proficient in English and with a basic French knowledge, he possesses good command in various remote sensing and GIS packages, including Idrisi, Arcview, Arc/Info, ArcGIS, ENVI, Ermapper, and Erdas Imagine, with fair to good command in Python and R. Dr. Mahiny's research interests span change detection and modeling for environmental management, application of AI, RS, and GIS to natural resources assessment, ecosystem services mapping, and scenario development. Noteworthy achievements include the publication of 15 books in Persian over the last decade, leading the completion of the Golestan Province land use planning project, and suggesting and implementing research in urban growth modeling, ecosystem services mapping, and Python coding, all while imparting knowledge to master's and Ph.D. students.

Abstract:
Urban areas are experiencing rapid global growth, shaped partly by government-driven top-down plans and partly by unaccounted forces influenced by communities and economic factors. The outcome is often a blend of predetermined plans and somewhat random development. In this context, urban change modeling serves as a tool to comprehend potential future configurations of developed areas across landscapes. This discussion introduces SLEUTH urban growth modeling, exploring its integration with ecosystem structures and functions. SLEUTH employs various inputs, including slope, land use/cover maps, excluded areas from urbanization, historical urban area maps, transportation network changes, and a hillshade layer for illustrative purposes. Through cellular automata and Monte Carlo iterations, the model establishes growth coefficients through three calibration steps, enabling the depiction of likely future urban changes. Importantly, the model allows envisioning non-path dependent futures, offering the flexibility to adjust coefficients for different desired outcomes. The excluded layer, informed by ecosystem structures and functions, may contribute to more sustainable future developments. Results can be compared, highlighting areas needing attention for future planning. This information empowers decision-makers to intervene with improved plans for both urban development and ecosystem management. This presentation provides background information on the modeling approach and discusses applications of SLEUTH in addressing real-world ecosystem management challenges, including my own and other researchers' efforts in this field.

Keywords: SLEUTH, Ecosystem Structure, Ecosystem Function, Scenario, Win-Win Situation

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