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# Dynamic land use/cover change modelling

Geosimulation and  
multiagent-based modelling



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**Dynamic Land Usecover Change Modelling**  
**Geosimulation And Multiagent Based Modelling**  
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**Arezoo Sanei**



## **Dynamic Land Usecover Change Modelling Geosimulation And Multiagent Based Modelling Springer Theses:**

**Dynamic land use/cover change modelling** Jamal Jokar Arsanjani, 2011-10-01 The thesis is an original and novel contribution to land use land cover change analysis using methods of geosimulation and agent based modeling The author implements several traditional methodologies of land use change by means of remote sensing and GIS techniques An Agent Based Model was developed in order to simulate land use change in the Tehran metropolitan area comparing the outcomes of each particular methodology All methods are compared and advantages and disadvantages discussed *Dynamic land use/cover change modelling* Jokar Arsanjani Jamal, 2013-11-29 The thesis is an original and novel contribution to land use land cover change analysis using methods of geosimulation and agent based modeling The author implements several traditional methodologies of land use change by means of remote sensing and GIS techniques An Agent Based Model was developed in order to simulate land use change in the Tehran metropolitan area comparing the outcomes of each particular methodology All methods are compared and advantages and disadvantages discussed

**Dynamic land use/cover change modelling** Jokar Arsanjani Jamal, 2011-10-05 The thesis is an original and novel contribution to land use land cover change analysis using methods of geosimulation and agent based modeling The author implements several traditional methodologies of land use change by means of remote sensing and GIS techniques An Agent Based Model was developed in order to simulate land use change in the Tehran metropolitan area comparing the outcomes of each particular methodology All methods are compared and advantages and disadvantages discussed *Geomatic Approaches for Modeling Land Change Scenarios* María Teresa Camacho Olmedo, Martin Paegelow, Jean-François Mas, Francisco Escobar, 2017-10-26 This book provides a detailed overview of the concepts techniques applications and methodological approaches involved in land use and cover change LUCC modeling also known simply as land change modeling More than 40 international experts in this field have participated in this book which illustrates recent advances in LUCC modeling with examples from North and South America the Middle East and Europe Given the broad range of geomatic approaches available it helps readers select the approach that best meets their needs The book is structured into five parts preceded by a foreword written by Roger White and a general introduction Part I consists of four chapters each of which focuses on a specific stage in the modeling process calibration simulation validation and scenarios It presents and explains the fundamental ideas and concepts underlying LUCC modeling This is complemented by a comparative analysis of the selected software packages practically applied in various case studies in Part II and Part III Part II discusses recently proposed methodological developments that have enhanced modeling procedures and results while Part III offers case studies as well as interesting innovative methodological proposals Part IV revises different fundamental techniques used in LUCC modeling and finally Part V describes the best known software packages used in the applications presented in Parts II and III

**Research and Management Practices for Conservation of the Persian Leopard in Iran** Arezoo Sanei, 2020-12-11 The population of the Persian leopard *Panthera pardus*

saxicolor has drastically declined this Asian leopard subspecies has disappeared from some parts of its former range. Containing large areas of potential habitats with leopard presence across almost all of its provinces, Iran is known to be the last stronghold for the Persian leopard in the region. This book comprehensively covers research, management and conservation practices of the Persian leopard, including the first phase of the Persian Leopard National Action Plan in Iran together with an innovative leopard insurance program and a contingent valuation practice with respect to the wildlife trafficking law enforcement in Iran. Research on a hypothesis about the risk of a major fragmentation and splitting the leopard distribution range in Iran into a northern and a southern part. An innovative and empirically fitted species and region specific approach for assessing the cumulative effect of land use and land cover changes on the leopard persistence. Distribution modeling of leopard potential habitats on a regional basis accompanied by ground validation techniques. An evaluation to three threshold rules to define the habitat suitability indices. Persian leopard habitats and relative corridors in the trans boundary areas of the East Azarbaijan province of the northwest of Iran in the Caucasus Ecoregion. The innovative research and conservation approaches presented in this book will be of great interest to those studying the leopard and other large carnivore species. The innovative models presented in this book about cumulative effect of the land use and land cover changes will be beneficial to land use managers, planners and decision makers in selecting wildlife friendly solutions for development programs. The strategic and action planning model as well as the leopard compensation program as an insurance scheme are developed specifically for the local condition and leopard status in Iran.

**Modelling Land-Use Change** Eric Koomen, John Stillwell, Aldrik Bakema, Henk J. Scholten, 2007-08-14. This book provides a full overview of land use change simulation modelling, a wide range of applications, a mix of theory and practice, a synthesis of recent research progress and educational material for students and teachers. This volume is an indispensable guide for anyone interested in the state of the art of land use modelling, its background and its application.

**Land Use Impacts on Climate** Xiangzheng Deng, Burak Güneralp, Jinyan Zhan, Hongbo Su, 2014-06-11. This book introduces a key issue in research on the climatic impact of land cover and land use changes via terrestrial biogeophysical processes. The parameterization of surface processes and a systematic approach to modeling the climatic impacts of land use change are discussed respectively and can be used to improve parameterization schemes for climate numerical models and to provide a systematic method, thus offering more scientific and enhanced support for research on the climatic effects of land use cover change. Further based on predictions and scenario analyses of land use changes in typical zones, the climatic impact of various types of changes in different areas can be simulated through climatic numerical modeling. The simulation results are suitable for use in climate mitigation, land use planning, urban development planning, etc. Thus the book is intended for researchers and professionals working in the area of meteorology, systems, climatic numerical modeling, climate change and land use cover change as well as decision makers in meteorology and land use planning. Professor Xiangzheng Deng is a senior research fellow at the Institute of

Geographical Sciences and Natural Resources Research Chinese Academy of Sciences      **Modelling Environmental Dynamics** Martin Paegelow, María Teresa Camacho Olmedo, 2008-07-16 Modelling environmental dynamics is critical to understanding and predicting the evolution of the environment in response to the large number of influences including urbanisation climate change and deforestation Simulation and modelling provide support for decision making in environmental management The first chapter introduces terminology and provides an overview of methodological modelling approaches which may be applied to environmental and complex dynamics Based on this introduction this book illustrates various models applied to a large variety of themes deforestation in tropical regions fire risk natural reforestation in European mountains agriculture biodiversity urbanism climate change and land management for decision support etc These case studies provided by a large international spectrum of researchers and presented in a uniform structure focus particularly on methods and model validation so that this book is not only aimed at researchers and graduates but also at professionals      **Agent-Based Models of Geographical Systems** Alison J. Heppenstall, Andrew T. Crooks, Linda M. See, Michael Batty, 2011-11-24 This unique book brings together a comprehensive set of papers on the background theory technical issues and applications of agent based modelling ABM within geographical systems This collection of papers is an invaluable reference point for the experienced agent based modeller as well those new to the area Specific geographical issues such as handling scale and space are dealt with as well as practical advice from leading experts about designing and creating ABMs handling complexity visualising and validating model outputs With contributions from many of the world s leading research institutions the latest applied research micro and macro applications from around the globe exemplify what can be achieved in geographical context This book is relevant to researchers postgraduate and advanced undergraduate students and professionals in the areas of quantitative geography spatial analysis spatial modelling social simulation modelling and geographical information sciences      **Land-Use and Land-Cover Change** Eric F. Lambin, Helmut J. Geist, 2008-01-08 This book presents recent estimates on the rate of change of major land classes Aggregated globally multiple impacts of local land changes are shown to significantly affect central aspects of Earth System functioning The book offers innovative developments and applications in the fields of modeling and scenario construction Conclusions are also drawn about the most pressing implications for the design of appropriate intervention policies      *Advancing Land Change Modeling* National Research Council, Division on Earth and Life Studies, Board on Earth Sciences and Resources, Geographical Sciences Committee, Committee on Needs and Research Requirements for Land Change Modeling, 2014-03-31 People are constantly changing the land surface through construction agriculture energy production and other activities Changes both in how land is used by people land use and in the vegetation rock buildings and other physical material that cover the Earth s surface land cover can be described and future land change can be projected using land change models LCMs LCMs are a key means for understanding how humans are reshaping the Earth s surface in the past and present for forecasting future

landscape conditions and for developing policies to manage our use of resources and the environment at scales ranging from an individual parcel of land in a city to vast expanses of forests around the world *Advancing Land Change Modeling Opportunities and Research Requirements* describes various LCM approaches suggests guidance for their appropriate application and makes recommendations to improve the integration of observation strategies into the models This report provides a summary and evaluation of several modeling approaches and their theoretical and empirical underpinnings relative to complex land change dynamics and processes and identifies several opportunities for further advancing the science data and cyberinfrastructure involved in the LCM enterprise Because of the numerous models available the report focuses on describing the categories of approaches used along with selected examples rather than providing a review of specific models Additionally because all modeling approaches have relative strengths and weaknesses the report compares these relative to different purposes *Advancing Land Change Modeling* s recommendations for assessment of future data and research needs will enable model outputs to better assist the science policy and decisionsupport communities

**Integrated Modelling of Ecosystem Services and Land-Use Change** Youjia Liang,Lijun Liu,Jiejun Huang,2019-10-17 This book presents essential case studies on the integrated modelling of ecosystem services and land use change in the field of landscape ecology The case studies were mainly conducted in the Zhangye oasis of the Hexi corridor and the upper reaches of the Heihe river basin including Loess plateau for wind power and the inland waterways of the Yangtze River for the regulation of extreme events The book puts forward an integrated modelling method including human activities natural processes land use change and ecosystem management and explores multiple scenarios based on the interests of local managers and their implications for ecosystem services As the book demonstrates the integrated modelling method for ecosystem services and land use change can serve as a valuable tool for gauging the impact of various development scenarios in this study area and in other regions with similar characteristics In addition numerous charts and diagrams are included in each chapter facilitating the simulation and assessment of specific land use change impacts on ecosystem services in various study areas *Agent-Based Modelling and Landscape Change* James D. A. Millington,John Wainwright,2018-09-27 This book is a printed edition of the Special Issue Agent Based Modelling and Landscape Change that was published in *Land Use Review and Assessment of Land-use Change Models* Chetan Agarwal,2002 *Land-Use Modelling in Planning Practice* Eric Koomen,Judith Borsboom-van Beurden,2011-08-25 This book provides an overview of recent developments and applications of the Land Use Scanner model which has been used in spatial planning for well over a decade Internationally recognized as among the best of its kind this versatile model can be applied at a national level for trend extrapolation scenario studies and optimization yet can also be employed in a smaller scale regional context as demonstrated by the assortment of regional case studies included in the book Alongside these practical examples from the Netherlands readers will find discussion of more theoretical aspects of land use models as well as an assessment of various studies that aim to develop the Land Use Scanner

model further Spanning the divide between the abstractions of land use modelling and the imperatives of policy making this is a cutting edge account of the way in which the Land Use Scanner approach is able to interrogate a spectrum of issues that range from climate change to transportation efficiency Aimed at planners researchers and policy makers who need to stay abreast of the latest advances in land use modelling techniques in the context of planning practice the book guides the reader through the applications supported by current instrumentation It affords the opportunity for a wide readership to benefit from the extensive and acknowledged expertise of Dutch planners who have originated a host of much used models

Modeling the Dynamics and Consequences of Land System Change Xiangzheng Deng, 2011-09-06 Modeling the Dynamics and Consequences of Land System Change introduces an innovative three tier architecture approach for modeling the dynamics and consequences of land system change It also describes the principle modules and the applications of the three tier architecture model in detail The approach holds strong potential for accurate predictions of the land use structure at the regional level simulating the land use pattern at pixel level and evaluating the consequences of land system change The simulation results can be used for the planning of land use urban development regional development environmental protection and also serve as valuable information for decision making concerning land management and optimal utilization of land resources The book is intended for the researchers and professionals in land use or land systems regional environmental change ecological conservation as well as the land resource administrative agencies and environmental protection agencies Professor Xiangzheng Deng is a senior research fellow at the Institute of Geographic Sciences and Natural Resources Research Chinese Academy of Sciences China

An Agent-based Model for the Simulation of Urban Land Use Change at a Cadastral Scale Anthony Jjumba, 2009 Cities are complex systems in which the diverse stakeholders who have conflicting values and priorities interact to directly influence the process of urban land use change These interactions which are characterized by a strong competition for space can be represented by an agent based model in order to better understand and analyze urban systems and to forecast possible future urban land use patterns In this study an agent based model that simulates the process of urban land use change at a cadastral scale by modeling the actions of the key stakeholders in the city has been developed The generated simulation outcomes provide various land use change scenarios and they indicate that the urban planning policies implemented in the model and the characteristics of relocating households influence the changes in land use patterns This study contributes to the advancement of agent based models that can assist in the process of urban land use planning

Special Issue on Modelling Land-use Change for Spatial Planning Support , 2008

**Toward Integration of Bayesian Networks with Geographic Information Systems and Complex Systems Theory for Urban Land Use Change Modelling** Verda Kocabas Ersahin, 2008 Human initiated land use change is the most significant factor behind the loss of agricultural and forested areas thus global climate change It is important to understand the reasons behind land use decisions as it is to understand their consequences Empirical observations and controlled experimentation

are not usually feasible methods for studying this change Therefore researchers have employed complex systems theory or complexity theory to help them understand and model dynamic land use change process in cities Cellular automata CA theory and agent based modeling have widely applied in land use change modelling CA models can easily model spatial process that is changing over time and can handle fine scale dynamics of these spatial processes Agent based models ABMs excel at relating the heterogeneous behaviour of agents with different information different decision rules and different situation to the macro behaviour of the overall system While both have advantages they have a number of challenges when applied to land use change One of the aims of this dissertation is to develop novel modelling approaches that integrate geographic information systems GIS CA and ABMs with Bayesian Networks BNs for overcoming limitations in the modelling process by significantly reducing the tedious work in defining parameter values transition rules and model structures As the use of land use models in planning is not widely accepted and not trusted fully by the urban planners the other aim is to link land use models with planning support systems PSS especially to use enhanced ABMs in PSS Therefore the proposed modelling approaches were applied to assist in understanding the patterns and controls of land use change both spatially and temporarily for the Metro Vancouver region They were used to analyze the effects of planning decisions in accordance with the sustainable development point of view

**Special Issue: Integrated Modelling of Natural and Social Systems in Land Change Science** Eleanor Milne,2009



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