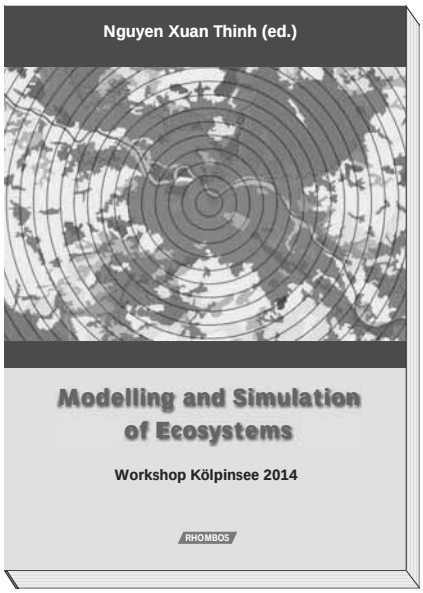
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Modelling and Simulation of Ecosystems
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PREFACE

Modelling is an essential element in science and research. In every scientific discipline modelling and simulation is the third pillar for the development of knowledge, in addition to theory and experiment. This book documents the revised contributions to the 18th Workshop Modelling and Simulation of Ecosystems in 2014 and reflects the variety of approaches and tools of the modellers as well as the wide range of modelling and simulation of ecosystems.

In the contribution of **Mirschel, Ajibefun**, and **Wieland**, the yield of winter wheat, winter barley and silage maize is estimated area-wide for the five Eastern German states with the help of the Spatial Analysis and Modeling Tool (SAMT) and the regional yield evaluating model YIELDSTAT. The yield results from the climatic time period 1971-2000 were contrasted with those from the time period 2021-2050 and changes in the yield dependent on climatic changes were shown.

Kopec presents a method to efficiently determine and evaluate optimal routes of power lines, which was developed in the project "Bewertung und Planung von Stromnetzen" (evaluation and planning of grids) supported by the Federal Ministry for Economic Affairs and Energy. The evaluation follows the approach of the multi-criteria Pareto-optimization and is meant to generate universally valid results and routes of power lines based on a nation-wide and harmonized spatial database.

Holnicki, Kaluszko, and **Stankiewicz** present selected results of air quality forecasts in Warsaw Metropolitan Area, Poland, for 2012 year's emission and meteorological dataset. The regional scale CALMET/CALPUFF modelling system is used as the forecasting tool for air pollution predictions.

Studziński, Wójtowicz and **Ziółkowski** present an ICT System which was developed in the Systems Research Institute of Polish Academy of Sciences and is designed for the management of municipal water systems.

In his contribution **Malinowski** deals with reliability analysis of a flow network with directed links and three types of nodes: inflow points, transit-only nodes, and outflow points.

The paper of **Owsiński, Mażbic-Kulma, Stańczak et al.** deals with the identification of the location of changing places between modes of transport to get to the city center. It is devoted to the formulation of the problem, description of some algorithms used in solving this problem within a definite procedure that is proposed by the authors, and the discussion of the potential consequences for the broader systemic environment, i.e. city shape and dynamic externalities.

Zhao and **Thinh** attempted to quantitatively analyze the relationship between urban form and energy consumption. Spatial metrics were utilized to measure urban forms with the help of ArcGIS, Erdas Imagine and Fragstats. Simultaneously, the energy consumption from urban districts was estimated based on the Nighttime light data (NTL).

The article of **Schwarzak** and **Behnisch** exemplarily describes the application of an approved measure concept of the use density weighted urban sprawl by Schwick and Jaeger for the city region of Berlin and explains the components contained and their spatial variation using a concentric zone model.

Behnisch, **Lehmann**, and **Schumacher** deal with the question to which extent a comparative description of cities regarding the topics compactness, efficiency and environmental quality is possible using index-based analyses.

Using a self-developed approach, **Vogel** shows how the INSPIRE Consolidated UML Model under the extension of the software-development tool Enterprise Architect can be modeled automatically for the most part in PostgreSQL/PostGIS-databases.

The contribution of **Tran, Johns, Hochman et al.** deals with problems of rainfall runoff prediction in ungauged catchments. It attempts to quantify the effects of non-linear input determination and model parameter cross-relationship using Partial Mutual Information (PMI) algorithm grouping parameters into sets.

In the contribution of **Elmorshdy** and **Thinh,** Integrated Coastal Zone Management (ICZM) and Spatial Planning Policies with respect to Land Use and Land Cover (LULC) changes and the identified deficits, gaps, and obstacles are studied in order to better implement ICZM in the light of environmental and socio-economic perceptions. Also land suitability analysis by integrating Analytic Hierarchy Process (AHP) and Compromise Programming (CP) for Multiple Criteria Decision Making (MCDM) is described.

Spieß, Thinh, and **Wieland** present a multiple criteria evaluation of the suitability of sites for settlement based on grid cells and the Fuzzy Theory.

In the article of **Wieland, Meier, Deumlich et al.** the application of historical maps, non-cartographic data and environmental information accessible nowadays in the reconstruction of historical landscapes (percentage of forest- and non-forest-areas) with utilization of Random Forest Models is shown.

Wieland, Thinh and **Spieß** deal with the further development of the Spatial Analysis and Modeling Tool (SAMT) to a Tool for the management of floodings. Management of floodings here means the evaluation of the suitability of re-activatable potential retention areas by using an integrated Multiple Criteria Decision Making Method (MCDM-method). The authors discuss the new paradigm of open science.

Li and **Thinh** applied the cellular automata (CA) model to simulate future urban growth scenarios. The paper proposed the integration method of Multi-Criteria Evaluation (MCE) and Analytic Hierarchy Process (AHP) that can be utilized to effectively translate the qualitative descriptions for scenarios into quantitative spatial analysis.

Balschmiter presents a dispersion model of the western corn rootworm that was developed based on cellular automata to analyze dispersion scenarios taking into consideration dynamic population processes, crop rotation strategies and methods to combat.

Brodziak and **Bylka** describe and analyze state of the art decision support tools for water intake operators and show their possibilities. They discuss the need and concept for integration of tools for decision support on water intakes.

In a further contribution **Vogel** describes the system architecture and preferred technologies as well as a suitable prototype development environment for web-based decision-support systems in order to manage spatial databases from Parameterized Regional Futures (PRFs) in the context of global climate change.

Wei Hou and **Walz** analyze the landscape pattern in two aspects: habitat connectivity and landscape contrast. A vector-based algorithm named “multi-buffer” approach is applied in a real-world test site for mapping ecological networks (econets) using small habitats as stepping stones.

I would like express my special thanks to all the authors for their exemplary work and their very cooperative collaboration in the creation and improvement of the contributions. Katja Schimohr has created the PDF file of the book with great efforts. Dr Szilvia Kollar, Jakob Kopec, Florian Spieß and Karin Laske have helped in the review of the contributions. They deserve my thanks. Mr. Bernhard Reiser, publisher Rhombos, I express my great thanks for his excellent support and his valuable suggestions for improving the book layouts and for the design of the cover of the book.

Nguyen Xuan Thinh

September 2015

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