Eric Koomen, John Stillwell, Aldrik Bakema, and Henk J. Scholten, eds. *Modeling Land-Use Change: Progress and Applications (GeoJournal Volume 90).* Dordrecht, The Netherlands: Springer, 2007.

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There is no question that we are experiencing a golden age of spatial modeling. Dramatic improvements in computer hardware and software, the increased availability of spatial data, and an increased concern with issues such as global warming, urban sprawl, and environmental degradation are inspiring academics and professionals around the world to develop a diverse and growing collection of computer-based tools for understanding the world and informing the policy making process.

This book provides a reasonably non-technical review of the "state of the art" in modeling land use change. It includes twenty-one case studies describing model applications from thirteen countries, prepared by authors from thirteen countries. Most of the authors and applications are from Europe; none of them is from the Americas.

I realize that it generally isn't a good idea to provide a chapter-by-chapter review of an edited book. However, I feel that it is necessary in this case to convey adequately the diversity of modeling approaches and applications provided in this impressive collection.

The book begins with a brief but useful description of the major types of land use change models and an overview of the theoretical approaches underlying most current modeling efforts. The chapters in the first of six parts to the book describe models that have been used to analyze past land use changes and identify the causes for these changes. The first chapter analyzes the changes in Albania where 550 agricultural cooperatives managed under a centralized economy were replaced by 467,000 privately owned farms operating under a market economy. The other chapters analyze land use changes in the Limamat Valley of Switzerland, near Haifa, Israel, and in the Pearl River Delta of China, one of the world's most rapidly urbanizing areas.

The chapters in the second part describe models that attempt to simulate observed land use changes. A particularly interesting chapter describes a spatial interaction model that was used to simulate the historical development of Corvo Island in the Azores over the past 400 years (no typo!). The other chapters describe a Markov

chain model for analyzing the land use changes in southeastern Spain and the use of a multinomial logistic regression model and Bayesian inference to disaggregate coarse-resolution land use data in Belgium.

The chapters in the third part describe recent efforts to develop land use optimization models. The first chapter describes the use of genetic algorithms to minimize nitrogen deposition from agriculture and optimize the spatial coherence of natural areas in The Netherlands. The second chapter describes a linear programming model that was used to determine the optimal combination of land, technology, and resources in the Himalayan region of India. The final chapter describes an evolutionary algorithm that was used to minimize soil erosion and maximize carbon sequestration, subject to a set of suitability constraints, in southern Portugal.

The chapters in part four report on the application of new modeling approaches that have received a lot of attention in recent years. The first chapter describes the application of the *UrbanSim* microsimulation model in Tel Aviv. The second chapter describes a multi-agent system for simulating the location decisions of households and firms in the Austrian Rhine Valley. The third chapter provides an update on the ambitious multi-agent-based *PUMA* system being developed for 1.5 million households in the Dutch Randstad. The final chapter describes a model that integrates a cellular automata model and a regional dynamic simulation model to simulate the development of Chiang Mai, Thailand.

The six chapters in the final two parts of the book describe the application of the several widely used land use change models for policy analysis in the Netherlands and Germany. The Web site that accompanies the book (www.lumos.info/ModellingLand-UseChange/Exercises.htm) includes eight exercises that introduce a number of land use change data sets, describe Von Thunen's land rent model, and provide working versions of Conway's famous Game of Life, the Starlogo multi-agent simulation program, and two models described in the book. The exercises are suitable for use in a class, although the text is not.

As the preceding review indicates, this collection graphically illustrates the power that modern geo-spatial have for modeling land use change. It is particularly useful in demonstrating the application of a wide range of modeling techniques to a diverse range of "real world" problems in very different parts of the world. The book is clearly written and amply illustrated (unfortunately in black and white) and provides an extremely useful update to the model reviews provided by Agarwal et al (2001), Brail and Klosterman (2001), and Geertman and Stilwell (2002).

I recommend this book highly for anyone who interested in assessing the current state of the art in land use modeling. It is clearly the most informative source of current information on this increasingly important topic that is available today.

References

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