

## **Felix F. Kienast, Otto Wildi, and Suchartia Ghosh (eds), A changing world: challenges for landscape research**

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In the first half of the twentieth century, ecology was featured with many different views such as Tansley's ecosystem concept from Great Britain, Sukatchev's geo-botany from Russia, Braun-Blanquet's socio-community view from France and Switzerland, and Clements' succession theory along with Gleason's individualism from North America. It is these diverse views of nature that cleared much of the confusion in ecology, and to allow it to mature into a recognized scientific discipline. In the past 30 years, the field of landscape ecology seems to be following a similar pattern, starting with pattern reorganization and quantification of heterogeneous land surfaces (i.e., landscapes) and evolving to include ecological and physical processes, social influences (e.g., the relationship between humans and their surrounding landscapes), natural resource management, applications of advanced technology (e.g., remote sensing, GIS, spatial statistics, and information technology), and the policy-making process. One obvious piece of evidence is the emergence of an increasing number of publications under the umbrella of landscape ecology. The "Landscape Series", supported by Springer and edited by Drs. H. Décamps, B. Tress and G. Tress, for example, has put out eight volumes since 2003. These unique views, just like those views 50+ years ago in

ecology, will help to advance landscape ecology to its maturity. This book, coordinated by Kienast and colleagues, is the most recent volume of this series that provides the scientific community with some eye-opening material by including the importance of social dimensions in the dominant view of modern landscape ecology in North America.

This text is divided into three sections: (1) value systems (i.e., people's perception), (2) ecological observations and processes, and (3) spatial pattern reorganization, time series, and dynamic modeling. The first section was centered on human and landscape interactions, or value systems (i.e., social perception). In the first chapter, Buchecker et al. introduced the fundamental concepts and theories on values and used two case studies (interest group vs. the general public and locals vs. tourists) to illustrate how survey data regarding the values/environment can be difficult when humans are included in the study. A call for value systems in landscape research was strongly voiced. In the following three chapters, the authors collectively presented further background into the original terminology, uses in historical policy/regulations, and roles in biological diversity. Clarification between "space" and "place" by Hunziker et al. was quite unique and stimulating.

The second section (6 chapters) consists of text on data collections, analyses, interpretations and "ecological" research in landscapes. Through illustrations of remote sensing technology in landscape analysis, Zimmermann et al. brought up key issues, such as the

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nature of data (e.g., resolution, frequency), appropriate collection of data (e.g., accuracy, scale, sampling, validation, and error analysis), and potential applications (e.g., GAP analysis) in today's ecological research. Then, Lanz et al. emphasized the importance of data quality (e.g., quality assessment, metadata) and integration (e.g., internet, virtual databases). A list of challenging questions was provided within the context of long-term data sharing and management. Model use of temporal and spatial data was then illustrated through four research topics: dendroclimatological data for paleoclimatic research (Esper et al.), historical and current land use (Bürgi et al.), landscape genetics (Holderegger et al.) and landscape connectivity (Sutter et al.). Through these chapters, the authors provided us not only a concise summary of current knowledge and interesting questions, but also good examples on how ecological processes can be examined in a landscape context. For example, Holderegger and colleagues demonstrated the use of neutral genetic diversity for detecting spatial movement of species and genes. Case studies of the decolonization of the Norway spruce in Europe after a recent glacier, gene flow among English yew populations in historical times, and current gene flow/migration using progeny analysis and assignment tests were incorporated to conclude that "Spatially explicit genetic investigations at the scale of real landscapes have meanwhile become necessary."

The final section (6 chapters) aimed at spatial pattern reorganization, time series analysis, and dynamic modeling. These chapters are similar to the popular content in North American landscape ecology but with a better summary for each topic and the challenges facing eco-oriented landscape ecologists. For example, Bollinger et al. overviewed the quantitative studies of landscape structure but placed an emphasis on landscape indicators. Wildi and Orlóci, after a brief review of the vegetation science, provided: (1) eight basic choices involved in quantifying vegetation in four-dimensional areas (space + time), and (2) six principles for plant community study in a landscape context. This was followed by two chapters on spatial analysis (Ghosh and Wildi) and time series (Ghosh et al.). The remaining two chapters were dedicated to summarizing the state-

of-the-art modeling, including up-scaling based on the hierarchical theory (Lischke et al.) and the Spatially-Linked spatio-temporal (SLST) models. The five important roles of the SLST model are: developing theories, generating and testing hypotheses, scenario exploration, projection and optimization, and decision support for management. The authors then summarized the use of landscape models based on their informal observations from professional meetings among landscape modelers.

Each chapter begins with a summary and a feature photo to highlight the points—a favored approach since there are too many issues under each topic. I have been conducting landscape teaching and research for over 20 years but still learned quite a lot from this text. Through my reading, I learned many new lessons such as "The Savannah Landscape Theory", "Prospect-Refuge theory", "information process", "psycho-evolutionary model (visual configuration)", etc. This text is not only an important publication for us to understand some of the Europeans' view of the landscape, but also a critical reference for landscape researchers to direct our future research.

This text contains the views of scientists primarily located at the Swiss Federal Research Institute. However, this is at a cost of cohesiveness and specifics among chapters. For example, there is excellent text on the social aspects with suggestions but one would still be frustrated by not knowing how to link to the socio- and physical sciences. A synthesis chapter to link these chapters would greatly enhance the value of this text. Finally, it seemed that much of the discussion in this book is not only developed for landscape ecology, but for general environmental studies. For example, data quality issues, publishing, and sharing is widely discussed among many research programs such as the Long Term Ecological Research (LTER) and the National Ecological Observatory Network (NEON).

In conclusion, I found this book very stimulating and valuable for landscape researchers, students and practitioners. I foresee that this text will play an important role in the history of landscape ecology, just like those of pioneer ecologists in the first half of the twentieth century.