



Editorial

Preface

1. Introduction

Monitoring forest ecosystems is essential for understanding system functions, assessing change in response to environmental influences and management interventions, and developing models of forest dynamics. A number of monitoring, assessment, and experimental methods and procedures have been developed, each aimed at addressing informational needs for managing and conserving forest resources. Regional and national forest inventories provide estimates of standing volume by species groups and sizes classes; with repeated sampling, estimates of growth and change are also possible. The sampling intensity is relatively low with emphasis on broad-area distribution of sampling units to obtain representative data across broad areas. A second type of forest monitoring is termed forest observational studies (FOS). These studies are typically more limited in geographic scope, focusing on more intensive sampling of forest types or sites of interest. Forest observational studies are commonly employed to study long-term trends in forest growth and succession, to evaluate alternative silvicultural treatments, and/or to acquire data for modeling stand dynamics, growth and yield of forest types of interest. Designed experiments in which specific treatments are applied to a relatively small number of locations that are intensively monitored and measured represent a third type of approach to gathering empirical data needed to assess and model forest ecosystems. Oftentimes data from all three sources – broad scale forest inventories, observational studies, and designed trials – are utilized to develop an adequate data base for formulating forest policy and managing, modeling, and conserving forest resources. While the distinctions among field data collection designs are not sharp and clear, forest observational studies (FOS), which play a major role in providing critical information to contemporary forest resource management, are the main focus of this special issue.

The aims and objectives of FOS vary widely, which have led to differences in their designs, variables of interest, and measurement protocols. Observational studies provide information at various scales, ranging from specific sites where management actions have been or will be implemented to large geographical regions or an entire nation. If designed well, FOS can advance scientific understanding of forest ecosystems and provide critical information to inform forest policy and management.

This issue on “Forest Observational Studies” is an outgrowth of an International Workshop hosted by Beijing Forestry University September 20–21, 2012, and attended by a selected group of scientists from Australia, China, Europe, and North America. Proceedings from the workshop (Zhao et al., 2012) were published; however, due to the importance of the topic and the interest generated by the workshop in Beijing, a special issue of *Forest Ecology and*

Management was proposed. This special issue consists of journal articles based on presentations at the workshop as well as contributions by scientists working in the area of FOS who were not in attendance in Beijing.

2. Contents of special issue

The contents of this collection of papers that consider various aspects of forest monitoring can be arbitrarily put into four categories: (i) overviews and general aspects, (ii) sample plots, (iii) spatial analyses, and (iv) FOS applications and uses. The first group of papers provides background and overview information on forest observational studies. Schulze (2013) summarizes observational and experimental approaches to study plant and ecosystem processes, Daume et al. (2013) explore how forest monitoring can be complemented by social media mining to provide a holistic view of ecosystems as social-ecological systems, and Condit et al. (2013) promulgate a framework for the design and standards of large forest monitoring data bases.

The next two papers deal with specific aspects of type of plots used in forest observational studies. Tewari et al. (2013) describe plot types (tree count and tree re-measurement) used in forest monitoring in India; Lilleleht et al. (2013) give procedures for mitigating edge bias when circular plots are used in forest monitoring.

The third group of papers deals with various aspects of spatial data analysis, a timely topic in forest ecology and management. Zhang et al. (2013a) investigate harvest event analysis using mark correlations, Zhang et al. (2013b) present results on diversity accumulators spatial structure and facilitation, Wehenkel et al. (2013) examine spatial structure in continuous cover forestry, Hui and Pommerening (2013) present results on spatial diversity, mark mingling and mark differentiation, and Ni et al. (2013) show results from use of bivariate diameter/height distributions to differentiate between mature and immature canopy species.

The fourth and final grouping of papers covers applications and uses of forest observational studies. Álvarez-González et al. (2013) address blending of forest observational and forest inventory data for developing forest models, Pretzsch et al. (2013) discuss modeling changes in growth and stand allometry, and Temesgen et al. (2013) focus on developing accurate height-diameter functions for complex forests. In the final paper, Anderson and Poage (2013) illustrate use of observational studies to develop guidelines for riparian zone management.

This special issue contains background information, definitions, examples, and state-of-the-art applications of various aspects of FOS. It is our hope that it will provide a stimulus and platform for additional research and development of this important tool

for forest resource conservation and management. Long-term monitoring of forests is clearly needed, but it requires strong institutional commitment over extended periods to produce useful results. In that regard, we hope that the information and ongoing efforts presented herein will provide further justification and impetus for forest research organizations around the world to implement and maintain forest observational studies.

Acknowledgements

We acknowledge and thank those who were pivotal in the conceptualization and production of this special issue on Forest Observational Studies. The vision and impetus for this special issue came from Dr. Klaus von Gadow, retired professor, University of Göttingen, Germany. Our gratitude goes to Dr. Peter Attiwill, Editor-in-Chief of Forest Ecology and Management, for his painstaking care with editorial processes and details that are essential to producing a collection of papers focused on a selected topic. Special thanks are also extended to all of the reviewers who contributed greatly to improving the contents of this issue.

References

- Anderson, P., Poage, N., 2013. The density management and riparian buffer study: a large-scale silviculture experiment informing riparian management in the Pacific Northwest, USA.
- Álvarez-González, J.G., Cañellas, I., Alberdi, I., Gadow, K.v., Ruiz-González, A.D., 2013. National forest inventory and forest observational studies in Spain: applications to forest modeling.
- Condit, R., Lao, S., Singh, A., Esufali, S., Dolins, S., 2013. Data and database standards for permanent forest plots in a global network.
- Daume, S., Albert, M., Gadow, K.v., 2013. Forest monitoring and social media – complementary data sources for ecosystem surveillance?
- Hui, G., Pommerening, A., 2013. Analysing tree species and size diversity patterns in multi-species uneven-aged forests of Northern China.
- Lilleleht, A., Sims, A., Pommerening, A., 2013. Spatial forest structure reconstruction as a strategy for mitigating edge-bias in circular monitoring plots.
- Ni, R., Baiketuherhan, Y., Zhang, C., Zhao, X., Gadow, K.v., 2013. Analysing structural diversity in a temperate forest.
- Pretzsch, H., Biber, P., Schütze, G., Bielak, K., 2013. Changes of forest stand dynamics in Europe. Facts from long-term observational plots and their relevance for forest ecology and management.
- Schulze, E.-D., 2013. Large-scale biogeochemical research, an overview.
- Temesgen, H., Zhang, C.H., Zhao, X.H., 2013. Modelling tree height–diameter relationships in multi-species and multi-layered forests: a large observational study from Northeast China.
- Tewari, V.P., Sukumar, R., Kumar, R., Gadow, K.v., 2013. Forest observational studies in India: past developments and considerations for the future.
- Wehenkel, C., Corral-Rivas, J.J., Gadow, K.v., 2013. Quantifying differences between ecosystems with particular reference to selection forests in Durango/Mexico.
- Zhao, XiuHai, Zhang, ChunYu, Gadow, Klaus v. (Eds.), 2012. Forest Observational Studies, Proceedings of an International Workshop, Beijing Forestry University, China, 153p.
- Zhang, C., Ni, R., Zhao, X., Gadow, K.v., 2013a. Analysing selective harvest events in three large forest observational studies in North Eastern China.
- Zhang, C., Jin, W., Gao, L., Zhao, X., 2013b. Scale dependent structuring of spatial diversity in two temperate forest communities.

Harold E. Burkhardt

*Department of Forest Resource and Environmental Conservation,
College of Natural Resources and Environment,
Virginia Polytechnic Institute and State University (Virginia Tech),
310 West Campus Drive, Blacksburg,
VA 24061, USA*

E-mail address: burkhardt@vt.edu

Hailemariam Temesgen

*Department of Forest Engineering, Resources and Management,
College of Forestry,
Oregon State University,
Corvallis,
OR 97331, USA*

Available online 25 November 2013