Contents

Foreword vii
Contributors ix

1 Soil Erosion Modeling and Conservation Planning 1
James C. Ascough II
Dennis C. Flanagan
John Tatarko
Mark A. Nearing
Holm Kipka

2 Nitrogen Component in Nonpoint Source Pollution Models 27
Yongping Yuan
Ronald Bingner
Henrique Momm

3 GPS, GIS, Guidance, and Variable Rate Technologies for Conservation Management 65
John Fulton
Matthew Darr

4 Identifying Riparian Zones Best Suited to Installation of Saturated Buffers: A Preliminary Multi-Watershed Assessment 83
Mark Tomer
D.B. Jaynes
Sarah Porter
David E. James
T.M. Isenhart
5 Vegetative Filters
Mike Dosskey
Surendran Neelakantan
Tommy Mueller
Zeyuan Qiu

6 Identifying and Characterizing Ravines with GIS Terrain Attributes for Precision Conservation
David J. Mulla
S. Belmont

7 Grassed Waterways
Peter Fiener
Karl Auerswald

8 Terraces
Allen Thompson
Ken Sudduth

9 Elements of Precision Manure Management
Peter J.A. Kleinman
Anthony R. Buda
Andrew N. Sharpley
Raj Khosla

10 Irrigation Management
David L. Bjorneberg
Robert G. Evans
E. John Sadler
11 GIS and GPS Applications for Planning, Design, and Management of Drainage Systems
   Vinayak S. Shedekar
   Larry C. Brown

12 Calculating Soil Organic Turnover at Different Landscape Position in Precision Conservation
   David E. Clay
   Jiyul Chang
   Graig Reicks
   Sharon A. Clay
   Cheryl Reese

13 Precision Conservation for Biofuel Production
   Indrajeet Chaubey
   Cibin Raj
   Qingyu Feng

14 Precision Conservation to Enhance Wildlife Benefits in Agricultural Landscapes
   Mark D. McConnell
   L. Wes Burger, Jr.

15 Precision Conservation and Water Quality Markets
   Ali Saleh
   Edward Osei
Field- and Farm-scale Assessment of Soil Greenhouse Gas Mitigation Using COMET-Farm
Keith Paustian
Mark Easter
Kevin Brown
Adam Chambers
Marlen Eve
Adriane Huber
Ernie Marx
Mark Layer
Matt Sterner
Ben Sutton
Amy Swan
Crystal Toureene
Sobha Verlayudhan
Steve Williams

Precision Conservation and Precision Regulation
G.F. Sassenrath
J.A. Delgado
Agronomy Monograph 59, titled “Precision Conservation: Geospatial Techniques for Agricultural and Natural Resources Conservation”, comes at a time of rapid transition towards more spatial and temporal precision in agricultural management. It makes a strong case for conservation planners and practitioners to avail themselves of modern GIS, GPS and decision support tools available for other agronomic practices such as GPS tractor and implement guidance, precision planting, and fertilization and pesticide applications. These geospatial technologies are fast becoming mainstream tools in conservation planning, assessment and implementation. At the same time, these technologies are enabling collaboration across silos of divergent expertise in conservation and precision agronomic practices including irrigation and drainage. The 17 chapters of this book detail existing technologies and management methods and look forward to those on the horizon. The Editors, ASA/CSSA members Jorge Delgado, Gretchen Sassenrath, and Tom Mueller, masterfully bring together key experts to cover use of GIS and GPS tools to plan, design and place conservation structures and to explore economic consequences and opportunities for payback. These include water quality incentives, greenhouse gas offset markets, and established incentive programs offered by federal and state governments.

Much of the new work and methods covered by the book were engendered by the NRCS Conservation Effects Assessment Project (CEAP) established in 2002, which quantifies the impacts of conservation practices across U.S. croplands. From the beginning, CEAP integrated geospatial databases, partner monitoring data, and practice implementation data with analytical models. In so doing, it highlighted the potential for precision conservation now detailed in this book. Indeed, many of the authors are USDA ARS and university partners in CEAP. With its focus on environmental impacts at the watershed level, CEAP projects must take a geospatial approach and consider multiple conservation practices within a watershed, which in turn require a geospatial modeling approach much evident in this book. The work is also informed by outcomes from the Long Term Agro-ecosystems Research (LTAR) network. The LTAR network is a USDA-ARS-University-NGO joint effort at 18 sites across the United States, each of which contrasts “business-as-usual” practices with advanced “aspirational” practices, such as the precision conservation methods described in the book’s several chapters.

The editors argue effectively that we must go beyond 4 R nutrient management principles and practices (Right place, Right time, Right amount and Right kind) and include precise planning and siting of conservation practices if we are to achieve sustainable reductions in nitrogen and phosphorus in streams, rivers, and water bodies from lakes to seas. They advocate for a 7 R approach, which expands the 4 Rs to include Precision Conservation, including additional aspects of variable rate irrigation management and drainage management. The additional components are timely and essential since there has been a steady increase in irrigated area in watersheds most prone to nutrient outflows and since surface and subsurface drainage systems are ubiquitous to these vulnerable areas. This book will be a valuable resource as the American Society of Agronomy rolls
out the new Certified Crop Adviser specialization in Precision Agriculture. It will hold value for those with specializations in Sustainability and 4 R Nutrient Management as well. As a science-based guide to the present and future of precision conservation, the book has relevance for practitioner, researcher, and policy maker alike.

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Acknowledgments

Thanks and acknowledgments are extended to Nicole Sandler (American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America), and to Donna Neer (USDA Agricultural Research Service) for their contributions in helping edit chapters of the book. The editors would especially like to thank Danielle Lynch (American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America), who helped with the final editing of the book and layout of the chapters. The editors would also like to express their appreciation to all of the reviewers that contributed to the review of the book chapters, with special thanks to David Clay, who led the review of the summary chapter.
Dedication

With the challenges that humanity faces in the 21st century, including a changing climate and an expected increase in the occurrence of extreme events, conservation of soil and water resources will be critical for food security and environmental quality. This book is dedicated to farmers and ranchers across the world who are contributing to food security and conservation of land and water resources; as well as to conservation professionals, nutrient managers, and other technical personnel helping implement conservation practices on the ground to conserve the quality of air, water, and especially soil resources, for future generations.

Precision conservation can be applied not only to agricultural systems, but also to other soil and water conservation systems such as urban areas (e.g. parks), forests, and areas under construction, among other examples, in a given watershed. In the great majority of cases, they are part of watersheds that include agricultural systems. As described in this book, riparian buffers, sedimentation ponds, constructed wetlands and other resources and/or practices can be used with precision conservation to increase the effectiveness of conservation efforts across a watershed. This book is therefore also dedicated to foresters, biologists, and conservation professionals that are working to conserve these resources.

In short, this book is dedicated to everyone working in these conservation efforts.