Urban–Rural Interfaces
Linking People and Nature
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David N. Laband, B. Graeme Lockaby, and Wayne C. Zipperer, editors

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Foreword

Research at the World Bank reveals that 2011 was a historic year—for the first time in history, the world’s urban population exceeded that living in rural areas (http://data.worldbank.org/topic/urban-development). This trend is expected to continue at a rapid pace. By 2050 it is predicted that 67% of the world’s population will be living in urban settings. This tremendous demographic change will result in ever-increasing edge effects on rural environments and people. Managing the urban–rural interface is a major challenge in today’s society. Rural settings in or adjacent to urban areas provide opportunities for people to enjoy and appreciate the beauty of nature in a nearby setting. This interaction, however, also poses challenges in regard to encroachment on wildlife habitats, natural vegetation, and farming and ranching operations, including the inevitable conflicts from noise, light, odors, dust, wildlife encounters, and other land use compatibility issues.

*Urban Rural Interfaces: Linking People and Nature* provides an insightful and thorough analysis of the benefits and hazards of urban and rural interactions when they are in close proximity to each other. We believe this book is an excellent guide for confronting and solving these modern-day encounters. Read this book with the idea that almost every urban development will affect the rural surroundings. Whether this interaction is beneficial to all concerned and whether conflicts and environmental damage are avoided will depend on careful and deliberate planning. We think this book will serve as an excellent resource for urban planners, natural resource managers, farmers and ranchers, and concerned citizens.

Ken Barbarick, 2012 ASA President  
Jeffrey J. Volenec, 2012 CSSA President  
Gary Pierzynski, 2012 SSSA President
Introduction: Defining Urban–Rural Interfaces

There are two “traditional” approaches to defining the urban–rural interface. The first approach, embraced for decades by demographers and empirical researchers, was based on population density and reported by the U.S. Department of Commerce, Bureau of the Census. When human population per area exceeded some threshold number, the human inhabitants of that space were labeled “urban”; otherwise they were labeled “rural.” This metric was convenient for researchers because the Census Bureau provided data that became the point of departure for analysis and discussion. The second approach is familiar to anyone who, after driving for miles and miles along a country road rounded a corner or topped a rise and suddenly found herself confronted by an awkwardly low speed limit sign, followed shortly thereafter by residential housing, complete with manicured lawns, then by the stoplights, gas stations, fast food restaurants, and other stores that announced the shopping district. This transition from rural to urban is visual and, in many cases, spatially abrupt to the point of being mentally jarring.

This latter depiction can be found all across the United States, including Auburn, AL where two of the editors (David N. Laband and B. Graeme Lockaby) reside. The city of Auburn, which has grown rapidly for the past two decades, is located in otherwise rural, east-central Alabama. On the south side of the city, there is a new, large Publix grocery store, built on the site of what was, 2 years ago, a cattle pasture. In fact, part of the pasture still remains, sandwiched between the Publix and a new single-family residential housing development. But, to those of us used to seeing, by day, cattle contentedly munching grass in that location and, at night, a multitude of stars shining in the dark sky, the store with its bright lights that blot out the stars is ...different—awkward, intrusive, unsettling—welcome in certain respects, unwelcome in others.

This aspect of the “Publix-in-the-cattle-pasture” that is unsettling provides an indication that perhaps the urban–rural interface may be something other than either a visual distinction or something measured by population density. For those of us who are long-time residents of Auburn, new development, commercial or residential, alters what has been described as our “sense of place.” Our familiar physical surroundings help us define our lives, as do our friends, neighbors, local social traditions, and so on. Consequently, changes in those physical surroundings necessarily alter our sense of place.

Each new grocery store or housing development built has consequences not only for humans’ sense of place and human well-being but also for the well-being of plants and animals and, more generally, natural systems. The word “interface” implies a zone of transition—a place of change—between two aspects that are different. Tide pools are zones of transition between the sea and the land. As was suggested already, the urban–rural interface is characterized by change. The spatial transition from a natural environment to the built environment seemingly can be abrupt. It need not be, but it can be. We are learning that the visual transformation from rural to urban reflects a host of transitions and changes, each of which is of scientific interest in its own right. For example, transition from natural land cover, to human-controlled agriculture, to suburbia, to the hard-core urban center means changes in the type and extent of plant and animal habitat. Not surprisingly, changes in the type and extent of plant and animal habitat imply changes in the composition and population robustness of flora and fauna. But, both natural and human systems are complex. Change can, and usually does, have profound and complicated consequences. This suggests that interfaces will be of special interest not only because they are transition zones but also because of the far-reaching effects of change.

In this volume, we hope to provide readers a sense of the richness and complexity associated with urban–rural interfaces. Laying a demographic foundation for the entire presentation, Susana Adamo begins the book with an exploration of whether and how human demographics (the basic statistical characteristics of the population) reflect the
linkages along urban–rural interfaces, its discontinuities and continuities. Dr. Adamo discusses how urban–rural interfaces are shaped by urban transition, the process of rural restructuring, and the emergence of multifunctional rural spaces. Rather than depicting urban–rural interfaces as abrupt transition zones, she characterizes the urban–rural interface as a gradient between completely urban and completely rural areas and describes the demographics of this urban–rural gradient in terms of population size and density, population change, and structure and composition.

Following Dr. Adamo’s overview, we have organized the various chapters into three broad areas of inquiry. The first section focuses on changes in ecosystem/landscape structure and function along urban–rural gradients. Wayne Zipperer kicks off this discussion in Chapter 2 by analyzing the ecological ramifications associated with landscape change, primarily forest fragmentation and deforestation, resulting from urbanization. He reviews forest fragmentation from both landscape and site perspectives, exploring ecological aspects of edges, corridors, and roads.

In Chapter 3, Ge Sun and Graeme Lockaby identify the impacts of urbanization on hydrologic and biogeochemical processes that are critical to the quantity and quality of surface water flows and present water supply challenges in urban settings. Professors Sun and Lockaby argue that converting forest lands to urban uses increases stormflow rates and volumes, alters baseflow dynamics, and degrades water quality by increasing imperious surface areas. Alterations of watershed water cycles are the root causes of many chain reactions of stream ecosystem degradation present in today’s urban areas. They conclude by suggesting that innovative implementation of watershed services is a key means of mitigating impacts of urbanization on water and sustaining urban–rural ecosystems.

In Chapter 4, Susan Stein, Mary Carr, Ronald McRoberts, and Lisa Mahal provide an overview of how development at the urban–rural interface and projected increases in rural housing density affect forest systems, services, and health. Their discussion draws from the Forests on the Edge project, which has developed data and national-level mapping on private forest lands in the conterminous (lower 48) United States. The authors focus on rural lands because these lands provide critical ecosystem services that are being altered by increasing housing density; they focus on private forests because public forests are largely protected from direct impacts of increased housing density.

Cynthia Huebner, David Nowak, Richard Pouyat, and Allison Bodine discuss, in Chapter 5, the relationship between urbanization and nonnative invasive plant species. The chapter focuses on three aspects: urban areas as biodiversity hot spots and the primary source of nonnative invasive plant species, the urban–rural–natural area gradient in which both sites vulnerable to invasion and potential barriers to invasion may exist, and restoration, rehabilitation, or mitigation of patches with nonnative invasive plant species along the gradient and when it may be best to take each approach—or to do nothing.

The effects of urbanization on faunal biodiversity are reviewed in Chapter 6 by Sarah Reed, Heidi Kretser, Michale Glennon, Liba Pejchar, and Adina Merenlender. The authors present two case studies illustrating the variable responses of faunal biodiversity to land development along the urban–rural interface—specifically, the effects of exurban development on bird communities in Adirondack Park in New York and Sonoma County in Northern California. They also identify policy strategies for maintaining faunal biodiversity in areas experiencing rapid development pressures.

The second section of the book focuses broadly on changing human dimensions of urban–rural interfaces. Brett Butler leads off this section in Chapter 7 by taking data drawn from the National Woodland Owners Survey to provide a multidimensional look at changes in the pattern of private forest land ownership and, relatedly, parcelization—changes in the size distribution of land holdings—across the urban–rural spectrum. Why is this discussion so important? As Dr. Butler observes, “It is the owner of a piece of land who ultimately determines its fate….Therefore if we are interested in the fate of the forests, we must understand the people and organizations who control the land that forests grow on.”

In Chapter 8, Kathy Wolf focuses her contribution on ecosystem services. Ecosystem services is the widely embraced term that describes the full scope of nature's contributions
to human health and welfare. Dr. Wolf explores the distribution of ecosystem services across the entire landscape gradient, and considers the relative delivery of services in different settlement situations. An especially valuable aspect of Dr. Wolf’s contribution is her emphasis/recognition of cultural services and their relative importance across human communities of different densities and functions.

Bill Anderson, in Chapter 9, argues forcefully that the distinction between “urban” and “rural” has a strong political aspect. He starts by suggesting that “a logger and a book editor are not going to have much in common, culturally, politically, or recreationally” and that the implied differences manifest themselves in terms of politics generally and environmental policy specifically. Then, using Oregon as a laboratory, Professor Anderson provides an eye-opening analysis of empirical linkages between urbanization and voting in Presidential elections.

One of the intriguing claims made by Professor Anderson is that we can think about the urban–rural divide in terms of “…things like whether or not a person makes a living from products coming from a rural area versus someone whose living is decidedly urban in orientation.” Indeed so. This observation is pursued by David Laband and Francisco Escobedo in Chapter 10. They explore a number of economic aspects of relevance to urban–rural gradients, paying specific attention to: (i) the changing structure of economies; (ii) shifts in land, labor, and capital as rural areas become urbanized; (iii) taxation and the scope of public sector activities; (iv) the distribution of income and wealth; and (v) shifts in the environment and in the provision of ecosystem services.

Early in Chapter 11, John Schelhas, Sarah Hitchner, and Cassandra Johnson argue that it is “…necessary to acknowledge that some people and places are more vulnerable than others to environmental changes.” While this statement surely is correct, by itself it has little substance. What is of critical interest is the nature, extent, and causes of these vulnerabilities. Schelhas et al. provide that substance by contributing a framework for analyzing and understanding social vulnerability to environmental change across urban–rural interfaces. As part of their discussion, the authors review the literature on social vulnerability to environmental change, discussing indicator-based and causal approaches. Cases from research on social vulnerability for urban, rural, and interface areas illustrate how underlying social vulnerability interacts with environmental change to create specific risks for certain people. They conclude with a discussion of how understanding the causes of social vulnerability can help guide policy and management.

In Chapter 12, Wayde Morse discusses the movements of people along the urban–rural interface and subsequent implications for natural resources management and community planning. Professor Morse begins with an overview of recent historic migration patterns and motivations for those movements. Understanding the sometimes conflicting values and images of rurality between new in-migrants and long-time residents is highlighted as a particularly important issue for community leaders to negotiate. He follows this discussion with an overview of how communities have come to address some of those impacts through growth management and open space and farmland conservation policies. Public input to the planning process and development of these policies is outlined in terms of voting behavior and collaboration. Finally, Professor Morse introduces us to an emerging tool that can be utilized to help negotiate different community values and rural ideals—participatory GIS mapping of place and landscape values.

Spencer Meyer, Michelle Johnson, and Rob Lilieholm direct our attention in Chapter 13 to land conservation. They note that “several key innovations—including the genesis of federal Reserves, the National Park System, conservation easements, and landscape-scale conservation initiatives—have allowed the United States to conserve 30% of its land mass.” As they review the history of land conservation in the United States, Meyer et al. explore the public and private financing mechanisms that have facilitated land protection and discuss the roles of federal, state, and municipal governments, private organizations, and individuals, in the context of an evolving awareness of the interconnectedness between people and resources.

The final section of the book focuses on integrating human and natural systems. What happens in natural systems affects humans, and human activities affect nature. So from a
scientific perspective, it really is not possible to address comprehensively aspects/issues of urban–rural interfaces, where we know that change to human systems is occurring, without considering the bidirectional impacts with respect to natural systems. In Chapter 14, Steward Pickett, Mary Cadenasso, Peter Groffman, and Morgan Grove share the tools used for interdisciplinary research integration by scientists working in the Baltimore Ecosystem Study, Long-Term Ecological Research program. These include “shared frameworks, shared research questions, shared study sites, and engagement with the concerns of communities and policymakers.”

In Chapter 15, Susan Stewart, Miranda Mockrin, and Roger Hammer also address planning in the urban–rural interface, “an especially significant activity when residential growth is rapidly changing the ecosystem because the plans developed are intended to shape the course of growth and to set goals for its ultimate outcomes.” They discuss both narrow and broad interpretations of planning, what planning entails, and who is involved. They then consider how the postmodern turn has affected planning within and beyond resource management and discuss two new developments in planning that have come to play a prominent role in resource management planning: sense of place and collaboration in the planning process. The authors conclude by reflecting on how the social context for planning shapes the mix of traditional and newer planning ideas brought to bear on the planning process.

Finally, Evan Mercer and Wayne Zipperer (Chapter 16) address a topic of vital concern to both human and natural systems in the urban–rural interface—fire. They begin by noting that, “Between 1999 and 2010, an average of 1179 residences, 1156 outbuildings, and 42 businesses were destroyed by wildfire annually, and each year on average 21 firefighters die fighting wildfires. A chief cause of the increasing costs associated with wildfire has been the rapid growth of the wildland–urban interface and the concomitant increase in the number of citizens and property in wildfire prone areas.” Drs. Mercer and Zipperer examine the socioeconomic and ecological effects and trends of wildfire in the WUI, methods for assessing wildfire risk in the wildland–urban interface, and approaches to managing the wildfire problem, including fuels management, home construction, and design and community action programs.

David N. Laband, B. Graeme Lockaby, and Wayne C. Zipperer, editors
Contributors

William L. Anderson is associate professor of economics at Frostburg State University in Frostburg, MD, where he has taught since 2001. He received his Ph.D. in economics from Auburn University and his B.S. in journalism from the University of Tennessee. He has published in a number of academic journals, including Public Choice, Southern Economic Journal, The Independent Review, The American Journal of Economics and Sociology, and the Quarterly Journal of Austrian Economics. He also has published hundreds of articles and commentaries in magazines like Regulation, Reason, and The Freeman.

Susana B. Adamo is an associate research scientist at the Center for International Earth Sciences Information Network (Earth Institute) of Columbia University, adjunct assistant professor at SIPA (School of International and Public Affairs) and Columbia College, and co-coordinator of the Population and Environment Research Network (PERN). She is a social demographer with a background in geography, and her research includes environmental migration and displacement, dynamics of internal population mobility in developing countries, rural–urban demography, migration and health, and issues related to global population data sets. Her latest publications involve environmental migration and cities in the context of global environmental change; migration, poverty and environment; and the effects of climate change on population distribution and migration. Originally from Argentina, Dr. Adamo holds a B.S. in geography from the University of Buenos Aires, an M.S. in population studies from FLACSO-Mexico, and a Ph.D. in demography/sociology from the University of Texas at Austin.

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Brett J. Butler has worked for the USDA Forest Service since 1998. In 2000, he joined the Forest Inventory and Analysis program at the Northern Research Station where he co-directs the Family Forest Research Center (FFRC) and coordinates the National Woodland Owner Survey (NWOS). The FFRC is a joint venture between the USDA Forest Service and the University of Massachusetts Amherst charged with conducting and coordinating research to increase our understanding of family forest owners’ attitudes, behaviors, needs, concerns, and demographics. The NWOS was established to determine who owns the forests of the United States, why they own forests, and what they intend to do with it. Dr. Butler received a Doctoral degree from Oregon State University in 2005 and a Bachelor of Science degree from the University of Connecticut in 1995.

Mary L. Cadenasso is an associate professor and ecologist in the Department of Plant Sciences at the University of California, Davis with research interests in landscape, ecosystem, and plant ecology specifically focused on the role of spatial heterogeneity in system dynamics. She is involved in research on urban land cover and links to ecosystem and hydrologic processes, the influence of vegetation structure on nitrogen dynamics in California oak savannas, and the structure and function of riparian zones in Kruger National Park, South Africa.

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J. Morgan Grove (Ph.D. in Social Ecology) works for the Northern Research Station of the U.S. Department of Agriculture Forest Service. He is a research scientist and team leader of the Baltimore Field Station and a Co-Principal Investigator of the Baltimore Ecosystem Study Long Term Ecological Research Project (BES) and the District of Columbia–Baltimore City Urban Long Term Research Areas Exploratory Projects (D.C.-B.C. ULTRA-Ex). Grove is the lead PI for the social science research in BES and D.C.-B.C. ULTRA-Ex projects. He has worked in Baltimore since 1989, focusing in particular on the social and ecological dynamics of urban watersheds and residential land management.

Roger B. Hammer is associate professor of Public Policy at Oregon State University. His research efforts focus on the social, economic, and environmental determinants and consequences of population growth and redistribution, with an emphasis on improving understanding of the spatial dynamics of these processes. He received a master’s in City and Regional Planning from Cornell University and master’s and Ph.D. in Sociology from the University of Wisconsin–Madison. From 2001 to 2006, he was an assistant professor of Rural Sociology at the University of Wisconsin–Madison and a land-use specialist with University of Wisconsin-Extension. Previously, he served as the Associate Director, Acting Director, and Associate Consultant at the University of Wisconsin Applied Population Laboratory. He has also worked as a Community Planning and Development Representative with the U.S. Department of Housing and Urban Development (HUD) and as a U.S. Peace Corps Volunteer/Community Development Advisor in the Solomon Islands.

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David N. Laband received his Ph.D. in economics from Virginia Tech in 1981. He is the author of 9 books and over 120 articles in peer-reviewed journals. His research and teaching interests cover a wide range of topics related to economics and policy. Dr. Laband has been an occasional contributor to the Wall Street Journal and other major North American and Alabama newspapers. While at Auburn University from 1994–2012, he taught in both the Department of Economics and the School of Forestry and Wildlife Sciences. Dr. Laband currently serves as Chair of the School of Economics at the Georgia Institute of Technology.

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Adina M. Merenlender is an adjunct professor and cooperative extension specialist at the University of California, Berkeley. She leads a research and extension laboratory that uses landscape-scale field studies and spatially explicit modeling techniques to address applied research questions in conservation planning and watershed management. Her other interests include ecological monitoring, restoration ecology, cumulative impacts to watersheds, conservation finance, mitigation, and protected area planning.

Spencer R. Meyer is the Associate Scientist for Forest Stewardship in the Center for Research on Sustainable Forests at the University of Maine and a Ph.D. Fellow through the NSF-funded Sustainability Solutions Initiative at UMaine. In his current role he studies the interface between forest resources and the people who rely on them for economic, social, and environmental values. He collaborates with a broad spectrum of landowners, NGOs, and government agencies to address questions about how land conservation can best meet the multiple demands society places on forests. His current research focuses on identifying key conservation strategies that balance ecological sustainability with economic vitality. He holds an A.B. from Dartmouth College and an M.S. from the University of Maine.

Miranda H. Mockrin is a research scientist with the USDA Forest Service in Fort Collins, CO. She received her Ph.D. in Ecology in 2008 from Columbia University. Her research focuses on documenting changes in human demographics and residential development and understanding the effects of growing human populations and housing development on natural resource management and conservation.

Wayde Morse was an NSF IGERT Fellow and received his Ph.D. from the University of Idaho Department of Conservation Social Sciences and the Center for Tropical Agriculture Research and Higher Education (CATIE) in Costa Rica. His research was on the conservation and production decisions of landowners involved in Costa Rica’s program of payments for environmental services. He is currently an assistant professor in the School of Forestry and Wildlife Sciences at Auburn University. He has taught courses on Society and Natural Resources, Environmental Interpretation, Ecotourism, Environmental NGOs, and Ecosystem Services. He conducts research on many of these same topics both nationally and in Latin America.

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