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Corridor Ecology: The Science and Practice of Linking Landscapes for Biodiversity Conservation

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BOOK REVIEWS

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Corridor Ecology: The Science and Practice of Linking Landscapes for Biodiversity Conservation.—Jodi A. Hilty, William Z. Lidicker Jr., and Adina M. Merenlender. 2006. Island Press, Washington, DC. 323 pp. ISBN 1-55963-096-5 (paper), 1-55963-047-7 (cloth). $30.00 (paper), $60.00 (cloth).

With ever-increasing fragmentation of natural habitats and species populations by human land use change, a key goal of conservation biologists is conserving or restoring landscape connectivity. Corridors have been proposed as a tool for achieving ecological connectivity at various scales and for attaining multiple conservation objectives, including facilitating movement of individual organisms within a home range, fostering interchange among demes in a metapopulation, conserving migratory pathways and stopover habitats, and providing connectivity across entire biomes. Interest in applying the corridor concept to on-the-ground conservation has boomed over the last two decades, perhaps outpacing the development of the science that would guide corridor design. The authors of this book seek to fill this void by summarizing the available science on corridors and offering practical guidelines for preserving or increasing ecological connectivity. As such, the target audience includes conservation biologists, planners, land managers, and decision-makers concerned with land use. The backgrounds of the three authors help bridge this gap between science and application and include a young conservation biologist (J. Hilty) working for a nongovernmental conservation organization, a long-time academic scientist with expertise in both basic and applied population biology (W. Lidicker), and a midcareer conservation biologist working in cooperative extension at the interface of conservation science and on-the-ground application (A. Merenlender).

The authors have divided the book into three main sections of three chapters each. Part I contains much of the rationale and conceptual background behind why ecological connectivity is important, how land use change may disrupt it, and how fragmentation influences individuals, populations, and communities of organisms. Chapter 1 deals with land use change, including the recent expansion of exurban residential development, as a major driver of fragmentation. Chapter 2 reviews the effects of fragmentation on biodiversity. Chapter 3 provides in-depth coverage of ecological theory that is relevant to understanding the effects of fragmentation on individuals, metapopulations, and metacommunities. This chapter is perhaps the strongest in the book and will provide a good resource for both conservation scientists and nonscientists interested in land conservation and in the ecological theory underlying the application of corridor concepts. The treatment of metapopulations is particularly strong and illustrates why metapopulation theory is such a useful framework for conservation of populations in fragmented landscapes.

Part II contains important concepts and approaches related to connectivity. Chapter 4 presents approaches for achieving connectivity and discusses important considerations for assessing the function of a corridor in terms of spatial and temporal scales, level of biological organization (individual, population, community), and conservation goals. Chapter 5 emphasizes the importance of spatial context, particularly the influence of the dominant land cover type, or matrix, within which the corridor is embedded. A useful concept here and elsewhere is that poor-quality matrix and corridor habitat may ''filter'' species based on levels of mobility and habitat specificity, leading to drift in community composition within fragmented landscapes. Chapter 6 provides a healthy consideration of what could go wrong with corridors and potential drawbacks of trying to increase landscape connectivity for populations. An important point that the authors make is that effective corridors are better defined by function (e.g., facilitating organism movement) than by structure (e.g., a linear habitat strip on a map). Corridors by this definition are simply landscape features that provide ecological connectivity, and can be either continuous linear features or even discontinuous features such as ''stepping stone'' habitats or key migratory stopover points.

Part III applies the science of the previous sections and offers practical guidelines for corridor design, planning, and implementation. Chapter 7 deals with practical considerations in corridor design, such as defining spatial and temporal scales in relation to conservation goals, choice of focal taxa for corridor design, and the effects of corridor dimensions and continuity on function. The authors recommend making corridors as wide and continuous as possible, although necessary dimensions will depend on the goal of the corridor (e.g., providing habitat vs. simply functioning as a conduit for movement), the needs of the focal taxa, and the temporal and spatial scales over which the corridor is designed to function. Chapter 8 discusses planning for connectivity in the landscape. The authors again emphasize that the spatial and temporal scales of the ecological processes to be conserved are key to corridor design. Tools for identifying and prioritizing corridors for conservation include GIS-based mapping, population and habitat occurrence models for focal species, and

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land-use change models for determining which sites will be most vulnerable to future development. Chapter 9 examines strategies for implementing habitat conservation projects in general and corridors in particular. A particularly informative section highlights tools for achieving conservation on private lands, such as easements and other types of conservation agreements. The chapter ends with an overview of several projects in which ecological networks are being implemented to achieve various conservation benefits. The projects vary in scale, goals, and geographic location, with a strong international flavor. A short concluding section reviews some of the major concepts of the book and ends with future goals and directions.

Overall, the authors have done a solid job of weaving together concepts related to conservation science and practical application to meet the needs of their target audience. Landscape architects, planners, and land managers will find a useful review of the causes of habitat fragmentation and its effects on organisms, as well as general guidelines to consider when designing, planning, and implementing land conservation projects. For conservation scientists, this book provides an up-to-date literature review and reference list for recent research related to ecological connectivity, corridors, and fragmentation. Most examples relate to animals, particularly mammals and birds. Readers of *The Condor* may find particularly interesting the discussion of metapopulation dynamics and the implications of different types of metapopulations for conservation of the Florida Scrub-Jay (*Aphelocoma coerulescens*), the example of the Red Knot (*Calidris canutus*) as a species needing "stepping stone" connectivity in terms of stopover habitat during migration, and the examples of the effects of fragmentation on forest birds. In addition, conservation scientists will gain a better understanding of legal and financial tools (e.g., conservation easements) that are being used to advance conservation objectives on private lands.

Despite these strengths, I came away a little disappointed from my reading of the book. As one who gained an interest in the corridor concept based on the early literature in conservation biology and landscape ecology in the late 1980s and early 1990s, I was hoping to find that our understanding and documentation of how corridors work had increased substantially in the last decade-and-a-half. Instead, I found few specific examples of how corridors have been used by species of conservation concern and little record of how effective corridors have been in meeting conservation goals, except perhaps for local-scale corridors designed to facilitate wildlife movements across human barriers like roads. I suspect, however, that this scarcity of specific examples is more a reflection of the current state of the science on corridors than of any oversight by the authors. The authors themselves emphasize this discrepancy between the promise and popularity of corridors and the paucity of our scientific understanding and documentation of their effectiveness. This suggests that research on movements of organisms across landscapes and monitoring of corridor effectiveness should be high priorities for conservation scientists and practitioners.

All in all, I recommend this book as an up-to-date review of the state of the science on corridor biology, including some very good sections on the ecological implications of connectivity, combined with practical considerations of how to conserve land with corridors in mind. However, those hoping to find an arsenal of evidence for the effectiveness of corridors in conserving species of concern and specific guidelines for how to design corridors for particular species needs may be disappointed.—MARK D. DIXON, Department of Biology, University of South Dakota, Vermillion, SD 57069. E-mail: Mark.Dixon@usd.edu

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