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On the Road: Workable Solutions to the Problems of Roads and Highways

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ON THE ROAD: WORKABLE SOLUTIONS TO THE PROBLEMS OF ROADS AND HIGHWAYS

Road Ecology: Science and Solutions. Richard T. T. Forman, Daniel Sperling, John A. Bissonette, Anthony P. Clevenger, Carol D. Cutshall, Virginia H. Dale, Lenore Fahrig, Robert France, Charles R. Goldman, Kevin Heanue, Julia A. Jones, Frederick J. Swanson, Thomas Turrentine, and Thomas C. Winter. 2003. Island Press, Washington, DC. 481 pages. $55.00 (cloth), $27.50 (paper).

Fourteen authors, ranging from transportation specialists to ecologists, have collaborated to write this very useful compendium describing the newly minted discipline of "road ecology." The authors state that road ecology "uses the science of ecology and landscape ecology to explore, understand, and address the interactions of roads and vehicles with their surrounding environment." The book is not aimed at ecologists; rather, the book's intended primary audience is people associated with transportation, including engineers, planners, environmental specialists, economists, and social scientists. This perspective is one of the most beneficial aspects of the book. Although a large body of road-related literature is found in ecological journals, that literature may not be widely read by the engineers and planners who actually design and construct the nation's vast network of roads. The multidisciplinary focus of the book is revealed by its sponsors: the Federal Highway Administration, California Department of Transportation, and The Nature Conservancy. Although the book primarily features North American studies (United States and Canada), examples of road effects worldwide are included. The book is extensively referenced and well-written; technical jargon is largely absent. Illustrations include photographs and clearly drawn graphs and schematics, many adapted from previously published literature.

Despite the large and diverse authorship, the text flows easily throughout the book's 14 chapters. The book is organized into four major parts: 1) roads, vehicles, and ecology; 2) vegetation and wildlife; 3) water, chemicals, and atmosphere; and 4) road systems and further perspectives. Chapters are further subdivided into sections. For example, we find in Chapter 2, "Roads," such topics as the history of the road system and descriptions of the size and pattern of the road network in the United States. Chapter 10, "Wind and Atmospheric Effects," includes sections on microclimate and windbreaks, as well as vehicle disturbance and noise associated with traffic. The expected discussions of the effects of roads on wildlife are present (Chapters 5 and 6), including a review of the efficacy of wildlife passages and factors affecting vehicle-related mortality of wildlife. An extensive bibliography of more than 1,000 references offers the reader opportunity to delve deeper into original research about road effects. Furthermore, the subject index is detailed, with searchable topics such as "roadsalt: alternatives to" and "wetlands: road crossing effects."

Although road effects are most often considered in regard to forests, grasslands are not neglected here. In Chapter 12, the authors discuss road systems in agricultural lands, as well as in grazing and arid lands. The authors mention that, although traffic volumes are typically low in farmland, noise may travel long distances in such open country, leading to road avoidance by wildlife. Also mentioned are "prairie corridors," strips of native plants adjacent to roads that compete well with weeds and provide effective erosion control.

One interesting concept broached in the book under review is that of the "virtual footprint" of roads, meaning not only the physical area occupied by roadways and verges, but the cumulative ecological effects of roads over time and space. By focusing on reducing the virtual footprint, and by simply recognizing the extent of the virtual versus the physical footprint, managers and planners can more effectively address road management concerns.

An aspect of the book that I found especially appealing was its emphasis on solutions, as indicated by the title of the volume. The authors speak of a vision for transportation systems that provides not only for ecological processes and biodiversity, but also for "safe and efficient human mobility." Effects of roads and traffic on biological systems are described, as well as the less-often-discussed—at least by wildlife biologists—effects of nature on roads. These effects are especially well-illustrated in the chapter on water and sediment flows, in which the destructive forces of water on roads are discussed. Another useful feature of the book is the sprinkling of citable road-related facts throughout, such as the total length of the current public road network in the U.S. (6,250,000 km), or the percentage of public roads managed by the U.S. Forest Service (10%).

There is a burgeoning body of published literature addressing effects of roads on wildlife, plant communities, and other environmental features; this book provides a comprehensive summary of the myriad ways in which roads affect landscapes. The compilation of many studies under one cover is a welcome addition to the literature. Although the book resembles another recently published work entitled *The Ecological Effects of Roads*, by Ian F. Spellerberg (Volume 2 in the Land Reconstruction and Management Series, Science Publishers, Inc., 2002), the two volumes do differ. The Spellerberg book covers much of the same ground as that in the Forman et al. publication (e.g., mitigation of road effects, habitat fragmentation, chemicals and roads) but is less comprehensive, focuses more on studies conducted in Europe and New Zealand, and is somewhat more informal in approach.

Road Ecology would be a useful reference for anyone interested in environmentally responsible transportation planning. Furthermore, biologists or managers planning research or designing monitoring studies on effects of roads on wildlife, plant communities, or ecosystem processes will find much useful information in the volume. I highly recommend it for anyone engaged in such study.—*Mary M. Rowland, USDA Forest Service, Pacific Northwest Research Station, La Grande, OR 97850.*