

A Primer on Natural Resource Science. By Fred S. Guthery. 2008. Texas A&M University Press, College Station, TX, USA. 206 p. US\$40.00 hardcover. ISBN 13-978-1-60344-024-0. US\$19.95 paperback. ISBN 13-978-1-60344-025-7.

A primer is defined as a short book about first principles on a particular subject. In *A Primer on Natural Resource Science*, Fred S. Guthery takes first principles to a new level. Originally motivated by a teaching assignment to introduce philosophy of science to graduate students of wildlife science, the author has written a book appropriate for anyone engaged in natural resource science, be they experienced faculty and scientists or entry-level students. For nonscientists interested in natural resource ecology and management, this book can provide valuable insight into the scientific approach to answering questions about the natural world. Throughout the book, Guthery emphasizes that successful advances in natural resource science rely on careful thought and judgment at all stages of science, from conception and design through interpretation of results and publication.

In the first section of the book, "Perspectives," Guthery explores philosophical and human dimensions of science. The introductory chapter, "The Nature of Science," sets the stage by describing basic assumptions and activities inherent to the scientific process. In the next two chapters, Guthery describes numerous ways in which hypotheses are applied in research and discusses the roles that inductive, deductive, and retroductive reasoning play in the design and implementation of research projects. He asserts that although we must employ both inductive and deductive reasoning to advance natural resource science, induction is often viewed by philosophers as suspect or less worthy than deductive approaches. This leads to a trend in which the "vacuous hypothesis" is invoked to camouflage descriptive studies as hypothesis-driven research. His deliberations on these trends are thought provoking, yet at times humorous, and will stimulate much discussion and introspection among novice and seasoned scientists alike. In subsequent chapters, he hones in on how our existence as humans influences our pursuit of knowledge, how creativity can be used to improve our research perspective, and the role of critical thinking.

The second section of the book, "Practice," presents an applied, mechanistic overview of science. In the first chapter, Guthery compares observational and experimental approaches and discusses their relative strengths and weaknesses in natural resource ecology. A chapter on mathematics reinforces the value of a solid foundation in algebra, calculus, and probability in understanding complex concepts involving biological processes. Guthery's chapter on statistics critically examines the application of statistics in natural resource science. He eloquently argues that although inferential statistics are useful tools intended to support appropriate interpretation of scientific results, they do not revoke sound judgment and interpretation of biologically meaningful results. His critique of the widespread use of null-hypothesis significance testing serves as a wake-up call that the recent emphasis on rigorous statistical training and application may elevate statistical results over biological results. Three subsequent chapters provide thoughtful evaluation of model selection and interpretation in natural resource science. In the penultimate chapter, "Means, Ends, and *Shoulds*," Guthery reflects on the need to encourage that which advances knowledge and to identify and constrain practices that obfuscate an understanding of nature. In a humorous yet pragmatic analysis of the real or perceived quagmire that is the publishing process, Guthery's final chapter on publishing provides practical advice to anyone preparing to publish his or her research.

In *A Primer on Natural Resource Science*, Guthery's discourse on first principles of natural resource science is both stimulating and refreshing. Throughout the book, he references a wide array of research from wildlife, forestry, and range science to provide examples of research that span the continuum of the good, the bad, and the ugly. This book will stimulate discussions in introductory courses in research methods targeted toward new graduate students and may provide opportunities to explore concepts that may not otherwise be explicitly covered during graduate student training. For experienced scientists and faculty, Guthery's observations and point of view may serve to refresh their philosophical and practical perspectives on approaches to research in natural resource science. In addition, Guthery's interpretative discourse on inductive and deductive reasoning and descriptive vs. experimental research may strengthen the conceptual framework from which natural resource managers base their adaptive management strategies and decisions.

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