Preface

What This Book Is About

This book is about how ecological research can better harness the diversity of goals, ideas, and approaches of ecological researchers. But it is not a textbook or an instruction manual. Rather, it's a guidebook.

Ecology is a broad and heterogeneous field, so every ecologist needs to decide what questions to ask and how to answer them, and then explain and justify those choices to others. We all get plenty of practice at this, as authors and reviewers of research proposals, grant proposals, and scientific papers. But that practice tends to be narrowly focused on the particular proposal or paper at hand. The premise of this book is that you can learn a lot about what questions to ask and how to answer them not just by thinking about your own work, or the work of others on the same topic, but by thinking about work on other topics as well, and even work from different scholarly fields. This book will help you do that. It is a guidebook to the diverse ways in which ecological research is done, or could be done.

Who This Book Is for and How to Read It

This book is aimed at graduate students and postdoctoral researchers in fundamental ecology (I don't know enough about applied work to write a book about it). I think that established researchers will find the book interesting as well, though they may wish to skim discussions of topics and examples with which they are already familiar. I am less

sure of the value of the book to advanced undergraduates. My goal is to prompt critical thought, which requires the reader to have a foundation of background knowledge and opinions against which to evaluate the book's arguments.

You can read this book on your own, but I think and hope it is best read as part of a graduate seminar or reading group. It's meant as fodder for discussion and debate.

Some Other Things You Should Read besides This Book

Like any good guidebook, this one is personal and opinionated. Think of ecology as a big city, and me as a local who's lived there his entire life and likes showing people around.

Like any tour guide, I'm just one person. I have my own experiences and perspectives. Some of which are more or less widely shared with those of other ecologists, others of which are more or less unique to me. If you were touring the field of ecology with a different guide, you'd get a different tour. So don't take anything I say as gospel, or assume it's representative of all ecologists, or even of all ecologists who have some things in common with me. And definitely don't just read what I have to say! You'll be a better ecologist, and you'll also get more out of this book, if you read a bunch of other stuff too. Here's a short and inevitably *very* incomplete list of suggestions, in no particular order. Note that I haven't read everything on this list (yet!). In some cases I'm sharing recommendations from colleagues, blog commenters, and book reviewers.

- I started grad school in 1995, just as the field of ecology was starting to change quite fast in some quite big ways (see chapter 1). Ecologists as a whole are asking different questions now. The concepts and topics that I was taught to think of as the "core" of ecology aren't really the "core" of the field any longer. Which raises the question of whether they're still worth reading about, and if so, why. Personally, I think they're still worth reading about, for various reasons. I think many of those former "core" topics remain scientifically interesting, even though most ecologists these days study other topics. And I think knowing something about the history of your field helps you do better science in the present

day, even if you don't study those former "core" topics. If you want to learn about what were once the "core" topics of ecology, you can't go wrong with *Foundations of Ecology: Classic Papers with Commentaries*, and *Foundations of Ecology II*. Does what it says on the tin, as the British say. Each chapter lays out the history of ecological research on some "core" topic. Each chapter comprises a reprint of a foundational paper on the topic, followed by a historical review of subsequent research. The first volume covers earlier classic papers, the second volume covers papers from 1970 to 1995. Other books in the same series use the same format to cover various subfields of ecology: *Foundations of Tropical Forest Biology*, *Foundations of Biogeography*, and *Foundations of Macroecology*.

- Frank Egerton has a long series of articles on the history of ecological sciences in the *Ecological Society of America Bulletin*. It starts in ancient Greece and works its way forward to the year 2000. The focus is largely on work in Europe and North America. I've dipped in and out of the series. The series is available for free online: https://esajournals.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)2327-6096(CAT)Collections(VI)CollectionsBulletin.
- Sharon Kingsland is a leading historian of ecology. Her *Modeling Nature* is an outstanding history of population ecology up until the 1960s and '70s. You'll learn a lot about how mathematical models are viewed in ecology by reading *Modeling Nature*. Sharon Kingsland also wrote *The Evolution of American Ecology, 1890–2000* and recently published *A Lab for All Seasons: The Laboratory Revolution in Modern Botany and the Rise of Physiological Plant Ecology*.
- Laura Martin's *Wild by Design: The Rise of Ecological Restoration* is a history of an increasingly important area of applied ecology.
- The last decade or so has seen a rapidly growing number of papers and books that reframe, rethink, or critique what one might think of as "conventional" histories of ecology. Some of these papers and books foreground the achievements and perspectives of people who often are omitted from conventional histories of ecology (e.g., women; ecologists writing in languages other than English). Others discuss widespread, long-standing biases in researchers' thinking on various topics. Histories of natural historical, ecological, and other scientific work in Latin America include Pablo Gómez's *The*

Experiential Caribbean and T. P. Glick's article, "History of Science in Latin America," in *The Cambridge Encyclopedia of Latin America and the Caribbean*. Abena Dove Osseo-Asare's *Bitter Roots* is a classic history of botany in Africa, especially in relation to medicinal plants. Ambika Kamath and Melina Packer's *Feminism in the Wild* provides a feminist critique of behavioral ecology. In 2022 the journal *American Naturalist* published a collection of papers from scientists and social scientists, arguing that "systems of oppression" have shaped the content and practice of ecology and adjacent fields (Kamath, Velocci, et al. 2022 and references therein).

- I enjoy reading biographies and memoirs of scientists, but I confess that I don't usually take any inspiration or lessons from them. Scientists who merit a biography or memoir tend to be too singular for that. The one exception for me is population ecologist Dennis Chitty's memoir, *Do Lemmings Commit Suicide? Beautiful Hypotheses and Ugly Facts*. It's an unusual scientific memoir in that it's a record of admitted failure. Chitty spent his entire career trying and failing to explain population cycles in small mammals. It's a good book for thinking about the determinants of progress (or the lack thereof) in ecological research. Chitty is unusually explicit about the philosophy of science that guided his choices as to what studies to conduct and how to interpret their results. But your mileage may vary. Just because I mostly don't find scientific memoirs inspirational or instructive doesn't mean you won't. Other memoirs and biographies of ecologists, and scientists working at the interface of ecology and adjacent fields, include but aren't limited to E. O. Wilson's memoir *Naturalist*, Nancy Slack's G. E. Hutchinson biography, *G. Evelyn Hutchinson and the Invention of Modern Ecology*, Hope Jahren's memoir *Lab Girl*, and Jasmine Graham's memoir *Sharks Don't Sink: Adventures of a Rogue Shark Scientist*.
- In contrast to memoirs and biographies of scientists, I've found it quite helpful to read some philosophy of science. Even good scientists often struggle to articulate what makes for good science—what makes for a good scientific question, or a good answer to a scientific question. Philosophers of science sometimes are better at articulating what makes for good science than scientists themselves are. Michael Strevens's *The Knowledge*

Machine is an unusual and excellent philosophy of science book. It's a popular rather than an academic book, so it's very readable and accessible. And it presents Strevens's own ideas, in addition to summarizing the work of other philosophers of science. Peter Godfrey-Smith's *Theory and Reality* is a more conventional introductory treatment of the major lines of thought in philosophy of science. If you're looking for something more specific to ecology, ecologists Mark Taper and Subhash Lele's edited volume *The Nature of Scientific Evidence* is worth a look. Some of the chapters in Resetarits and Bernardo's edited volume *Experimental Ecology* also are worth a look, to see the contrasting ways in which different ecologists think about what makes their own research programs worthwhile.

- "Biodiversity" might be the single most important word in ecology today. Back when I started grad school, the term had only just been coined. The story of its coinage is quite interesting, and I think quite important for any ecologist today to know. David Takacs's *The Idea of Biodiversity: Philosophies of Paradise* chronicles the history of the term "biodiversity" through interviews with those who coined the term and promoted its use early on.