
Preface

One can argue about when ecology was born as a science, although surely the writings of Charles Darwin and Alfred Russell Wallace created the essential context for the emergence of a new study of the interrelationships of species with each other and with their environments. The term “oekologie,” combining the Greek words for “household” and “knowledge,” was coined in 1866 by the remarkable German scientist, philosopher, and physician Ernst Haeckel and first was developed in scientific depth in the 1895 textbook by the Danish botanist Johannes Eugenius Buelow Warming, *Plantesamfund—Grundtræk af den økologiske Plantegeografi* [*Plant Communities: An Introduction to Ecological Plant Geography*]. Ecology has come a long way as a subject, from Eugen Warming to global warming.

Ecology has its roots in natural history and, indeed, in evolutionary thinking. But ecology itself has evolved considerably since its birth, building bridges to mathematics, to the physical sciences and engineering, to molecular biology, and, increasingly, to the social sciences. Just as we are beginning to appreciate not only the beauty of natural systems but also their essential role in providing an infinite range of goods and services on which humanity depends, we are reluctantly also learning that we are destroying those life-support systems and threatening the sustainability of the biosphere as we know it. Ecology, the unifying science in integrating knowledge of life on our planet, has become the essential science in learning how to preserve it.

This volume is an effort to present, in one readable collection, the diversity of ecology, from the basic to the applied. It is meant to serve both as a reader for anyone interested in learning more about the subject and as an essential reference for college and university courses on ecology and sustainability as well as for advanced high school students and the interested lay public. As such, it builds on the basic principles of autecology, population biology, and community and ecosystems science, which form the foundation for discussions regarding current threats to sustainability and how we can manage the biosphere responsibly. *The Princeton Guide to Ecology* is organized into seven sections tightly integrated with one another. The

core textual material is supplemented by suggestions for further reading at the end of each article, by a glossary of key terms, and by a chronology that traces landmark events in ecology.

Ecology views biological systems as wholes, not as independent parts, while seeking to elucidate how these wholes emerge from and affect the parts. Increasingly, this holistic perspective, rechristened as the theory of *complex adaptive systems*, has informed understanding and improved management of economic and financial systems, social systems, complex materials, and even physiology and medicine—but essentially this means little more than taking an ecological approach to such systems, investigating the interplay among processes at diverse scales and the interaction between systems and their environments.

In many colleges and universities where ecology has flourished, botany and zoology have vanished as separate departments and been replaced by more integrative ones. Ecologists tend to organize their thinking across scales, from cells to organisms, from organisms to populations, from populations to communities, ecosystems, landscapes, and the biosphere. This view also dictates the organization of this volume, which begins with autecology, the study of the physiology, behavior, and life history of the primary integrative unit of ecology, the organism. From the organismal level, the next natural levels of organization are the population, then the community and ecosystem, and then finally landscapes and the biosphere.

With this basic foundation, the *Guide* then turns to more applied issues: understanding what biodiversity and the ecological systems in which they reside mean to us, as captured in the concept of “ecosystem services”; exploring the scientific basis for managing our natural systems and the resources we extract from them; and developing the theoretical principles underlying the conservation of natural resources. These chapters naturally reach out to other disciplines, including economics and the social sciences, for the partnerships that are essential in achieving a sustainable future for humanity.

If this ambitious effort has been successful, it is because of the exceptional quality of the authors and their contributions, and especially the remarkable set

of associate editors who have cheerfully integrated their sections and worked closely with one another to assure transitions as seamless as could be imagined. Anne Savarese at Princeton University Press and managing editor Chris Morris have assured smooth logistics throughout and added their own keen insights at appropriate times. I also am delighted to acknowledge the inspiration of Sam Elworthy, former editor-in-chief of Princeton University Press, who conceived the idea of the *Guide* and convinced me to take on the project.

As always, I am grateful for the unwavering support of Carole Levin, my wife and friend.

As we go to press, our happiness at the completion of this effort is mixed with sadness because of the untimely death on March 22, 2008, of our distinguished contributor, Robert Denno.

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