



Book Review

ESSENTIALS OF ECOLOGY

Third Edition

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The third edition of the book – *Essentials of Ecology* - is much more than a simple update, reflecting both fundamental and applied aspects of ecology. It introduces and presents in detail the relevant aspects of the unsustainable use of ecological resources, pollution, extinctions and the erosion of natural biodiversity.

The book has 510 pages and is divided into four sections including *Introduction; Organisms, Condition and Resources; Individuals, Populations, Communities and Ecosystems; Applied Issues in Ecology*.

Part one is organized into two chapters with suggestible title – *Ecology and how to do it* and *Ecology's evolutionary backdrop*.

Chapter 1 aims to show not only what ecology is but also ecologists appraisal, how ecological understanding is achieved and managed.

Chapter 2 reviews some aspects concerning evolution by natural selection and the ecology of speciation. The authors show that the populations of a species vary in their characteristics from place to place on both geographic and more local scales, and also to understand that natural selection may produce similar forms from widely different ancestral lines or same range of forms in populations that have become separated.

The second section (chapter 3-4), presented the conditions and resources, their influence on individual species and their consequences for the composition and distribution of multispecies communities.

Chapter 3, *Physical conditions and the availability of resources*, presents some aspects about the conditions and resources, as well as their influence on the individual species. The examples of the ways in which environmental conditions limit the

behavior and distribution of organisms are introduced and there are most examples on the effects of temperature, which serve to illustrate many general effects of environmental conditions. Special attention is given to resources used by photosynthetic green plants and the ways in which organisms that are themselves resources have to be captured, grazed or even inhabited before they are consumed. Finally there is much information about the ways in which organisms of the same species may compete with each other for limited resource.

Chapter 4, *Conditions, resources and the world's communities*, give the answer to the question of how the interplay of conditions and resources influence whole communities, who depends fundamentally on the scale at which we choose to study communities. The influence on conditions and resources, climate plays a major role in determining the large scale distribution of different types of community across the face of the Earth. However, local factors, such as soil type in terrestrial environments and water chemistry in aquatic environments, are responsible for patchiness in community composition on much smaller scales. In Section 4.2, there are presented the causes of spatial patterns in community distribution. Then, in Section 4.3, temporal patterns are analysed in conditions and resources that can change community composition over time scale from days to millennia. Section 4.4 describes the characteristics of the Earth's major terrestrial biomes and Section 4.5 deals with the diversity of aquatic communities.

The third section (Chapters 5 – 11) deals systematically with the ecology of individual organisms, populations of a single species, communities consisting of many populations, and ecosystems. To understand patterns and processes at

each of these levels it is needed to know the behavior of the level before.

Thus, Chapter 5, *Birth, death and movement*, discusses about these processes, the methods of monitoring them and their consequences.

Chapter 6 is about both the ecological and evolutionary effects of interspecific competition on individuals, on populations and on communities. Interspecific competition is one of the most fundamental phenomena in ecology, affecting not only the current distribution and success of species but also their evolution.

Reading the Chapter 7 (*Predation, grazing and disease*), it can be distinguished the similarities and differences among 'true predators', grazers and parasites, and also it can be understood the consequences of predation for community composition.

Chapter 8, *Evolutionary ecology*, is focused especially on co-evolution: pairs of species acting as reciprocal driving forces in one another's evolution. The question of co-evolutionary 'arms races' between predators and their prey is taken up in Section 8.3, with a particular emphasis on host-pathogen interactions. However, not all co-evolutionary interaction are antagonistic. Many species-pairs are mutualists. Some of the most important of these mutualisms (pollination, corals and nitrogen fixation, for example) are presented in Section 8.4.

Chapter 9, *From populations to communities*, presents some aspects concerning the importance of patchiness and dispersal between patches in ecological dynamics- and discuss especially the importance of the concept of the metapopulations. Disturbances also play an important role in the dynamics of many populations and the composition of most communities. After each disturbance, there is a pattern of re-establishment of species that is played out against a background of changing conditions, resources and population interactions. In this context, there are much information about temporal patterns in community composition and food webs.

Chapter 10, *Patterns in species richness*, explain the meaning of species richness, diversity indices and rank-abundance diagrams, and make us to understand richness gradient with latitude, altitude and depth, and during community succession.

Chapter 11, *The flux of energy and matter through ecosystems*, reviews some aspects concerning the flux of matter through ecosystems and the global biogeochemical cycles. There are much information regarding primary producers, decomposers and detritivores, a pool of dead organic matter,

herbivores, carnivores and parasites plus the physicochemical environment that provides living conditions and act both as a source and a sink for energy and matter.

The four section, *Applied Issues in Ecology* (Chapter 12 – 14), is dedicated to the pests and manage resources sustainable and to a diversity of pollution problems ranging from local enrichment of a lake by sewage to global climate change associated with the use of fossil fuels.

In Chapter 12 (*Sustainability*), is considered first the size and rate of growth of the human population, a primary driver of the environmental problems that confront us, and finally deal with two area of applied ecology where sustainability is a particularly pressing issue – the harvesting of living resources from the wild and the production, in unnatural agroecosystems, of the food and fiber of humankind.

The main aspects presented in Chapter 13 are: physical degradation and chemical pollution associated with cultivation, power generation and its diverse effects, degradation in urban and industrial landscape and maintenance an restoration of ecosystem services. All these aspects make us to appreciate the value to human welfare of ecosystem services lost when we degrade habitats.

Chapter 14 is dedicated to conservation. There are presented the threats to biodiversity and the options open to conservation biologists to maintain or restore biodiversity. The authors develop an armory of approaches that may help us to save endangered species from extinction and conserve some of the biodiversity of nature for our descendents.

Finally, all 14 chapters include self-assessment multiple choice questions for each chapter, an interactive tutorial to help us to understand the use of mathematical modeling in ecology, and high-quality images of the figures which makes the present book enjoyable to read.

In a concise, engaging style, this book contains the essential principles of ecology from the theoretical fundamentals to their practical applications, and could be very useful for students at all levels and for biological specialists.

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