

BOOK REVIEW

Limnoecology: The Ecology of Lakes and Streams. Lampert, W. and Sommer, U., 2nd edition. Oxford: Oxford University Press, 2007, 324 pp. ISBN ISBN-13: 9780199213931

This textbook was first published in German (“Limnoökologie”) in 1993. Oxford University Press published the English edition, translated by James Haney, in 1997. A second, revised German edition was released in 1999. The second English edition that is now available is not a direct translation, but an updated and extended version of the second German edition. The chapter on ecological genetics now includes several subchapters on the development and application of molecular genetic methods. Similarly, the use of stable isotopes for the analysis of aquatic food webs and carbon cycling has been incorporated. Subchapters and sections on species diversity and ecosystem functioning, climate change and conservation management complement this new edition.

The general purpose and the style of this textbook remained unchanged. “Limnoecology” is not a classical limnological or ecological textbook. The authors’ goal was “to highlight the possibilities and limitations of ecological theories in the field of aquatics”. Referring to Hutchinson’s famous collection of essays (Hutchinson, 1965), Lampert and Sommer use aquatic organisms to analyse the evolutionary play as an outcome of ecological interactions. Throughout this text, interactions between organisms and populations are discussed with respect to their selective advantage or disadvantage for the players. Although ecological research is often concerned with proximate factors, Lampert and Sommer always quest for the ultimate factor that may provide a gain in fitness for a certain genotype. Within this general framework, “Limnoecology” places clear emphasis on biotic interactions. This is obvious alone from the uneven length of the individual chapters. Following two short introductory chapters on the relationship between ecology and evolution (Chapter 1) and methods of ecological research (Chapter 2), the physical, chemical and hydroecological features of aquatic habitats are briefly dealt with in the third chapter. The following chapters follow a hierarchical sequence from individuals (Chapter 4) through populations (Chapter 5) to communities (Chapter 7). The

sixth chapter, simply entitled ‘Interactions’, is the core of the textbook, presenting numerous examples for competition, predation, symbiosis and parasitism, and their interactions among aquatic populations. Some ecosystem perspectives (Chapter 8), including man-made alterations and threats, round off the ecological play. The final chapter critically assesses the role of ecology as a scientific discipline in the present societal context.

The authors provide a plethora of examples, many of which originate from their own research and research conducted by their associates and collaborators. Winfried Lampert’s impressive work using *Daphnia* as “a model herbivore, predator and prey” (Lampert, 2006) is clearly visible throughout the text, since field and laboratory results on other taxa are not referenced to nearly as often throughout the book. Ulrich Sommer’s impact is the most obvious in the sections dealing with nutrient competition of algae and phytoplankton, which he studied early on in his career, and when *Daphnia* and copepod dominated food webs are compared. Presently, Sommer is the leading scientist of a large German research programme investigating the shift of aquatic communities in response to the climate change. Accordingly, he provides many examples of the issues of biodiversity and climate change. Yet, the reader does not get the impression that the various chapters have different authors; the text is easy to read, and the style of the book is consistent, reflecting the long-standing cooperation between these two eminent scientists. Both authors mainly worked on mesotrophic to eutrophic temperate lakes (e.g. Lake Constance). Accordingly, the selection of case studies focuses on the central European experience and is biased towards lake plankton. The authors are aware that some of their insight gained in north-temperate lakes cannot easily be applied to tropical or (ultra)oligotrophic lakes; one such an example is the seasonal succession of plankton outlined early in their conceptual model (Sommer *et al.*, 1986).

Results from many case studies and laboratory experiments are illustrated in numerous clear figures, most of

them conveniently found on the same or the opposing page. Text boxes explain the key methods such as molecular analysis of bacterial diversity and quantification of selectivity in some detail. Review questions at the end of most chapters help students to consolidate their knowledge. A table of abbreviations and a glossary facilitate rapid orientation for undergraduate students and researchers from disciplines outside limnology. Cross-referencing to previous and subsequent sections of the book and the book's index have been carefully edited.

With approximately 300 pages, this textbook cannot cover all aspects of freshwater ecology. Fields that are left out are, for instance, paleolimnology and hydroecology (eco-hydrology). Fisheries ecology has been treated cursorily, mainly with respect to predation and cascading effects on the food web. Microbes other than small eukaryotic algae receive little attention. Most microbial ecologists would hardly share Lampert's and Sommer's opinion that the ecological role of the planktonic viruses has not yet been examined. Similarly, the issue whether the microbial loop is a "link" or "sink" in the energy flow of pelagic ecosystems was hotly debated when the first German edition of this textbook was published (in 1993), but has become a non-issue since then. The lengthy discussion of the mechanistic theory of competition appears somewhat outdated considering that, as the authors concede, equilibrium conditions are rarely met *in situ*. Surprisingly, there is no hint that oscillations and chaotic fluctuations in species abundances allow the coexistence of many species depending on a limited number of resources (Huisman and Weissing, 1999). The potential significance of deterministic chaos and recent experimental evidence for its existence are briefly discussed in the chapter on populations. The emphasis the authors place on explaining competitive interactions and the predictive power of mechanistic models under equilibrium conditions illustrates their general view of ecology and natural selection. They consider themselves strictly "mechanistic-oriented" and oppose holistic approaches. For example, when discussing the relatively minor fluctuations in the use of energy in stream ecosystems, Lampert and Sommer conclude that the degree

of stability (constancy) is not a "system feature" but "simply a result of optimal resource utilization by each individual population". This is not to say that the authors adhere to Gleason's "individualistic concept" of community organization (Gleason, 1926). Lampert and Sommer clearly state, "a community is more than a random collection of individuals".

The reader of "Limnoecology" should bear in mind this general concept of the authors towards ecology and its tight coupling with natural selection. Within this context, I am unaware of any other textbook that explains basic ecological principles and evolutionary oriented, ecological thinking better than this one. The second edition of "Limnoecology" is not only "a must" for each graduate student of limnology, but also a most useful read for anybody interested in hypothesis-driven, ecological analyses. Although originally not intended as a classical textbook, "Limnoecology" already occupies a unique niche. If the authors keep the momentum to revise their textbook at regular intervals, we can already look forward to the third edition of "Limnoecology".

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Thomas Weisse
 Institute for Limnology of the Austrian Academy of Sciences
 A-5310 Mondsee, Austria
 thomas.weisse@oeaw.ac.at
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 available online at www.plankt.oupjournals.org