

PREFACE

FOR THE STUDENT

This book was written for you. We obtained as much student input as possible by having student reviewers assess the text and the approach used in it. The idea for the text was based on teaching students who were not satisfied with the existing texts. Teaching aquatic ecology and limnology have made it clear to us that most students enter ecological sciences for practical reasons. They often are concerned about conservation of resources from a classical (e.g., fisheries program) or from environmental issue perspectives. Most existing texts limit the applied aspects of aquatic ecology to a section at the end.

The aim of this text was to incorporate discussion of the issues as they arise when we cover the basic materials. This allows you to see the applications of difficult topics immediately and, we hope, provides additional impetus for doing the work required to gain an understanding. We also attempted to use the broadest possible approach to freshwater ecosystems; scale and linkages among systems are important in ecology. Most students in ecological courses had some interest in the natural world as children. They spent time exploring under rocks in streams, fishing, camping, hiking, or swimming, which stimulated a love of nature. This book is an attempt to translate this basic affinity for aquatic ecosystems into an appreciation of the scientific aspects of the same world. It is not always easy to write a text for students. Instructors usually choose a text, giving the students little choice. Thus, some authors write for their colleagues, not for students. We tried to avoid such pressures and attempted to tailor the approach to you. We hope you will learn from the materials presented here and that they will adequately supplement your instructor's approach. When you find errors, please let us know. This will improve any future editions. Above all, please appreciate the tremendous luxury of being a student and learning. You are truly fortunate to have this opportunity and we are grateful for the time you take with this text.

FOR THE INSTRUCTOR

We hope this book will make your job a little easier. The chapters are short, mostly self-contained units to allow the text to conform to a wide variety of organizational schemes that may be used to teach about freshwaters. This will also allow you to avoid sections that are outside the scope of the course you are teaching. However, we integrated environmental applications into the text because we view basic science and applications as integrated issues. We attempt to create instructional synergism by

combining these aspects of aquatic ecology. Describing applications stimulates student interest in mastering difficult scientific concepts. We employ a variety of pedagogical approaches in an attempt to engage student interest and facilitate learning. These include highlights, biography boxes, and method boxes. We have advanced sections for areas where you might want the students to get a little more in-depth, but in areas that we often skip in our own lectures for a first class in freshwater ecology. We also include an appendix on experimental design in ecological science and a glossary because we have found many advanced undergraduates have little exposure to the practical side of doing science. These sections help when we ask students to read and report on primary literature. It is always difficult to know what to include and where to go into detail. We supply some detailed examples to enforce general ideas. The choice of example is probably not always the best one, just the best one we could find while preparing the text. Suggestions for improvements in this and any other areas of the text are encouraged and appreciated. Thanks to the instructors using the first two editions that did just that. We apologize for any errors.

Why did we write this? In our experience, teaching limnology/freshwater ecology is more work than teaching other courses because of the breadth of subject, differential preparation of students, and associated laboratories, but always seems to be the most fun. Of course it is fun, it is the best subject! We hope this book facilitates your efforts to transmit what is so great about the study of freshwater ecology.

WHY DID WE WRITE A THIRD EDITION?

Given the money savings of used texts for students, there needs to be a good reason for a new edition. In the near decade since writing of the second edition, many new advances have occurred, and new topics have gained prominence with respect to environmental effects and hot areas of research interest. In our attempt to cover these new areas we have added over 800 new and updated references, 46 new figures, 67 figures updated to color, 1 new chapter, and expanded the length of the text. Particularly, we included more emphasis on toxins, pollution, and large-scale approaches than in the previous edition. Dedicated students in WKD's classes found numerous errors in previous editions (with a potential award of test points for each unique error), as did instructors across the country. We hopefully corrected these without introducing too many new ones. We hope you find this new edition even more useful than the last one.

ACKNOWLEDGMENTS

We thank Dolly Gudder, who was involved in all aspects of the writing and compilation of the first two editions of this book, including proofing the entire text, drafting and correcting all the figures from the first edition, library research, writing the first draft of the index, and obtaining permissions. Alan Covich provided extensive conceptual guidance and proofread the first edition of text; his input was essential to producing this work. Eileen Schofield-Barkley provided excellent editorial comments on all chapters of the second edition. The fall of 1998 Kansas State University limnology class proofed Chapters 1–8 and 11–18 of the second edition. The Kansas State University limnology (freshwater ecology) classes proofread all chapters (especially Michelle Let, Katie Bertrand, and Andrea Severson.). The L.A.B. Aquatic Journal Club, Chuck Crumly, Susan Hendricks, Stuart Findlay, Steve Hamilton, Nancy Hinman, Jim Garvey, Chris Guy, and Al Steinman provided suggestions on the first edition. Early helpful reviews on book concepts were provided by James Cotner, David Culver, Jeremy Jones, Peter Morin, Steven Mossberg, Stuart Fisher, Robert Wetzell, and F. M. Williams. The anonymous reviews (obtained by the publisher) are also greatly appreciated, including those who completed a detailed survey on the prospect of a second edition. Many of the good bits and none of the mistakes are attributable to these reviewers. We appreciate the support of the Kansas State University Division of Biology, the Kansas Agricultural Experiment Station, and Southern Illinois University Carbondale. This is publication # **19-234-B** from the Kansas Agricultural Experiment Station.

For the second edition, thanks to Lydia Zeglin for help on describing molecular methods. Excellent suggestions for corrections also came from Robert Humston, David Rogowski, John Havel, Sergi Thomas, Daniel Welsh, Erika Iyengar, Matt McTammany, Jack Webster, and Robert Humston. Kabita Ghimire produced the global distribution maps of freshwater habitats. Keith Gido, James Whitney, and Joe Gerken helped clarify Chapter 23. Thanks to Erika Martin, Joshua Perkin, and Kyle Winders for detailed review of the entire draft manuscript from the second edition. Thanks to Andy Richford who assisted in the development of the ideas for the second edition while he was editor at Elsevier.

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MRW and WKD's children, Hannah, Joey, Sadie, and Rowland, and grandchildren (Jaxon and Samuel) put it all in perspective; the next generations are the reason this text includes environmental applications. We both deeply appreciate the support and love of our families.