

Preface to the Second Edition

Ecology is a rapidly evolving subject, not least in the techniques available to the field ecologist. Since the publication of our first edition of this project guide, advances have been made in several areas, most notably those that take advantage of modern technological developments. Whilst field ecologists have always sought to invent new methods and improve existing ones for monitoring plants and animals, new mobile technologies increasingly enable the tools for identification and verification of organisms to be literally in a researcher's back pocket. Similar advances in mobile phone apps have facilitated environmental monitoring, which has the potential to reduce the amount of equipment the researcher has to carry and perhaps go some way to providing standardisation of monitoring tools. There has been continued refinement of previously laboratory-based techniques that provide access to information more cheaply and immediately in the field where once we would have had to take samples back to sophisticated laboratories for analysis. Further developments in other technologies have opened up new and exciting opportunities to survey our environment (in the case of drone technology, the sky is literally the limit!). As these developments bed in, it is appropriate to review the tools available to field researchers.

We have extended this second edition to cover a wider range of methods, with a special focus on more recent developments, emphasising the direction of travel of modern field ecology. Following positive feedback from many students and colleagues, we have increased the number of case studies, which demonstrate the realities of working in the field. Developments have also been made recently in the analysis of ecological data, and this is reflected in a broader coverage of some of the more accessible techniques and available software. Since communication of scientific results is highly relevant in today's confusing mix of fact and opinion, we have also expanded our coverage of presentation skills to include publishing in scientific journals and presentation at conferences.

We have been privileged to have had expert advice and constructive criticism from a large number of experts who, in addition to the input to the first edition of this book, have reviewed the plans and implementation of the second edition, provided case studies and photographs, read and commented on individual sections, and generally encouraged us in our endeavours.

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This handbook is designed as a guide to planning and executing an ecological research project and is intended as a companion to preparing a dissertation, report, thesis, or research paper. The idea for the book arose from many years spent in the field sampling animals and plants, as students ourselves, or later when leading groups of undergraduate or postgraduate students. In so doing, it was clear that there was a need for a book to cover all aspects of planning, implementing, and presenting an ecological research project. Much of the content of this text has been developed from teaching materials we have used over the years in one form or another, refined following discussions with colleagues and the students who used them. We have included those methods that should be accessible to an undergraduate or taught postgraduate student at a university or college. We have purposely tended to avoid devoting too much space to highly technical methods or those techniques that require the user to have a licence. However, we have mentioned some such techniques that generate data sets that may be made available for student projects.

Our experience is that many students develop an interest in a particular group of organisms, sometimes describing themselves as a birder, entomologist, or badger watcher. Rarely, one finds a student principally interested in a particular habitat; this is normally secondary and is often defined by the group under study. Consequently, although we have ordered the sampling chapters by the mobility of the organisms, within the chapter on sampling mobile animals, we have dealt separately with each group of organism under study. We have attempted to take the reader through all the stages in conducting a research project starting from finding a topic on which to do a research project; turning the idea into a provisional title and research question (i.e. the aims); thinking about how to achieve the aims (these are the objectives); and then deciding on the methods to be used. The book then summarises key methodological approaches used by ecologists in the field. The intention has been to cover core, well-tested, and robust methods relevant to sampling animals and plants in terrestrial and most aquatic habitats, including sandy and rocky shores. Due to additional health and safety requirements and the highly technical nature of off-shore sampling methods, we stopped short of including these techniques in the book.

This book is not just about the activities associated with field sampling. We felt that it was important to take researchers right through to the end of their project. Many of the more technical hurdles occur once the data has been collected. Ecological research frequently generates complex data sets that require statistical analysis to aid interpretation. There is a need for students to understand the range of methods

available to explore and analyse their data and to understand what types of data they need to collect in order to use particular techniques. Frequently, students ask us how they should go about finding and using key references, and how to interpret their own data in the light of current research. Consequently, we also give tips on presentation and writing style. Most research projects are completed in a fairly restricted timescale, therefore we include guidelines for time management during the project. We hope that this text will both encourage and support students in engaging in the fascinating world of ecological research.