

**Walter W. Piegorsch and A. John Bailer (2005):
Analyzing environmental data**

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This book covers an impressive range of topics. Chapter 1 deals with simple and multiple linear regression and ANOVA. Chapter 2 contains detailed discussions of several simple nonlinear regression models. Chapter 3 presents likelihood and quasi-likelihood estimation for GLIM, and discusses different models for counts data. Chapter 4 deals with the estimation of median effective dose, risk estimation, and benchmark, uncertainty and sensitivity analyses. Chapter 5 considers harmonic regression, ARIMA models, intervention analysis and growth curves. Chapter 6 presents distance methods for spatial data, semivariograms, and diverse variants of kriging. Chapter 7 considers mainly meta-analysis and historical control information. Chapter 8 begins with a survey of basic sampling techniques, and then discusses specialized environmental methods such as capture-recapture, quadrat and line-intercept designs.

The presentation is fairly uniform. Each section begins with a model, describes the main concepts involved, displays the relevant formulas and the SAS commands for their implementation, and gives a detailed example based on a real dataset. All chapters contain numerous exercises, most of them analyzing interesting real datasets, and some being more theoretical.

Although the relevant concepts for each situation are defined, their treatment may in many cases be too brief for the reader without a deeper statistical training. For instance, types I and III sums of squares are mentioned in page 20, but it is unlikely that the reader will understand their meaning. Simultaneous inference is briefly discussed in the Appendix, the formulas and/or commands for simultaneous confidence bands are given at several instances in the book; but it is unlikely that the reader will realize the important issues and potential pitfalls raised by multiplicity.

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The examples are used to demonstrate the analysis under a given model, but the model itself is seldom questioned. For instance, a superficial analysis of the data of Example 1.4 shows a strong heteroscedasticity, for which a log transformation would be adequate, but the text does not mention this feature. In several exercises the reader is advised to apply a given transformation; but in real life the analyst must decide whether and how to transform the data.

The book can be used as a basis for courses of different levels. For the reasons given above, a skilled instructor would be needed to clarify the relevant concepts and to guide the students to perform the necessary exploratory data analysis.