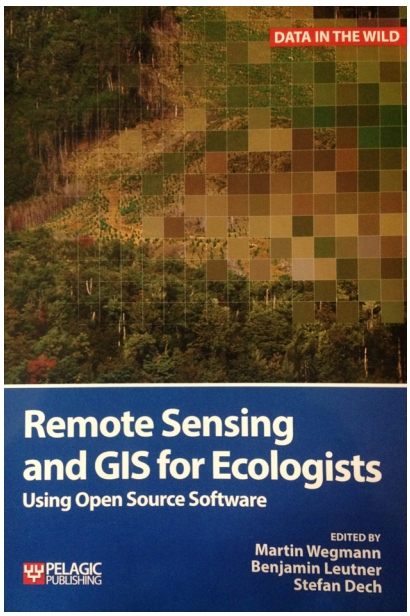

Remote Sensing and GIS for Ecologists: Using Open Source Software

Edited by Martin Wegman, Benjamin Leutner, and Stefan Dech

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Remote Sensing and GIS for Ecologists: Using Open Source Software provides instruction and examples of data processing and analysis in R and a few short tutorials in Quantum GIS (QGIS). The examples are framed for ecologists wishing to incorporate remote sensing (RS) data into their research. The book's target audience is an intermediate user with some prior knowledge about spatial data, RS approaches, and open source software (OSS). Therefore, this book is not aimed at specialists unless they specifically wish to gain a better understanding of how to use OSS in combination with RS data. The explicit assumption of the book is that most ecologists will be interested in using passive multispectral satellite data (primarily Landsat and MODIS).

All of the data used in the examples are conveniently available on the book website (http://book.ecosens.org) in addition to a R code cheatsheet, a forum, book updates, and more complex R scripts. The book is arranged to follow the workflow of a typical ecological research project. It begins with *in situ* sampling and defining spatial context and ends with extracting landscape information and performing statistical analyses. The first two chapters introduce geospatial data and the software used throughout the book. Chapter 3 presents common methods for acquiring spatial data, and Chapter 4 describes introductory data analyses and basic R commands. Chapter 5 delves into RS data pre-processing, covering topics including atmospheric correction, topographic illumination correction, masking and mosaicking. Chapter 6 compares several field-sampling methods. Chapter 7 presents vegetation indices, followed by land cover classification in Chapter 8. Data products created in these two chapters are then used for land cover change detection in Chapter 9. Chapter 10 returns to continuous land cover information by presenting fractional cover analyses. Chapter 11 covers time series analysis, while Chapter 12 addresses spatial metrics, such as moving window and smoothing methods. The final chapters present two methods commonly used by ecologists: species distribution modeling (Chapter 13) and spatial statistical analysis of animal movement (Chapter 14).

We review this book from the dual perspective of student and instructor. In this review, we offer the perspectives of both 1) a graduate research assistant with intermediate R experience and a background in Environmental Science, RS and image processing and 2) an assistant professor of geospatial analytics with a strong background in multi- and hyperspectral remote sensing applied to ecosystem ecology, biodiversity, and biogeochemistry.

From the perspective of a graduate student, this book made data analysis with R more approachable. The book covers a large range of topics in a typical RS data processing workflow. Replicating examples from this book has advanced my research progress, as they taught me to organize and simplify code, and continue to serve as a dictionary for scripting questions. This book is highly recommended as a self-guided study tool for fellow graduate students.

From the perspective of an instructor, this book provides a well-structured and clearly presented R tutorial for terrestrial RS applications. The logical flow of the book and examples used make it a good resource text for graduate student researchers wishing to incorporate RS in their research, and it would make an effective resource for upper division and graduate

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level courses that aim to introduce scripting for RS analysis. Indeed, it has inspired me to adopt several chapter in my own graduate level remote sensing course.

While no book on this topic can be exhaustive, the book provides a good balance of breadth and depth. The book openly addresses its gaps, and all chapters provide suggestions for further readings, but there are a few improvements in both conceptual content and R code that future editions should include. The overview of RS is well written, and includes a thoughtful discussion of resolution tradeoffs most ecologists have to evaluate when selecting RS datasets in Chapter 8, revisiting the discussion in a time series context in Chapter 11. Notably missing from these discussions however is consideration of spectral resolution, which significantly impacts RS analyses even in a multispectral context. Furthermore, future users should be aware that the book explicitly focuses on Landsat and MODIS data, fortunately, several of the methods presented can be adapted to processes and analyze other multispectral datasets.

Although the R code is typically well described, it is not introduced and commented uniformly. Some chapters, particularly towards the end, would benefit from more detailed instructions for replicating presented figures and additional comments for more complex lines of code (e.g., for-loops). In addition, there are several small sections in the book with irreproducible code, but these errors are not an appreciable detriment to the concepts presented. This would be quite beneficial to several users because presented figures are clear and nicely formatted and the code provides streamlined approaches to problem solving. In fact, most of these errors can be easily fixed by the reader, especially one with previous R experience. Thus, it is recommended, but not necessary, that users have some fundamental understanding of coding principles and feel comfortable with troubleshooting and debugging. Overall, *Remote Sensing and GIS for Ecologists: Using Open Source Software* meets its objective of introducing typical RS procedures and OSS solutions to ecologists and RS users wishing to expand their programming knowledge. This work certainly fills a gap in the literature, as very few books give such attention to using R code specifically for RS. The electronic version of the book (Kindle) is particularly effective as a resource for R users of all levels, as the many additional resources and websites referenced in the book are easily linked to and accessed in tandem with the text.

The presented content meets the needs of the target audience and allows RS data to be more accessible to ecologists. This book is further recommended to students who use RS data regularly, but desire a more structured procedure for pre-processing and analysis in R, and any environmental scientist interested in terrestrial RS.

Project Management

you really need? When dealing with unknowns this is no easy exercise.
  - Do you have the correct hardware/software?
  - Is programming or training support immediately available if needed?
  - Are you ready to increase/decrease change entirely on short notice?
- Controls:
  - Do you have increased controls in place? The touch points need to be very frequent. There need to be more checks and balances than with a regular project.
- Communications:
  - Is there a very clear and detailed communication plan?
  - Is there the ability to elevate concerns immediately at all levels?
  - What is the planned response time to all concerns, and can all management levels agree to operate under that plan?

The RDP project resembles all projects in that a PM should be reviewing and controlling all phases. The RDP project typically demands a more assertive and agile approach with an even more in-depth risk management plan throughout its lifecycle.

As RDP projects grow in frequency the PM will need to be sure to manage the ongoing risks that they present through to a successful delivery. With technology advancing at increased rates we can all look forward to managing a project portfolio that contains more RDP projects through to success!

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Raquel is very focused on process based approaches that unite program and business objectives, resulting in portfolio success.

If you have questions or topics that you would like to see discussed, please email them to PMP@asprs.org.