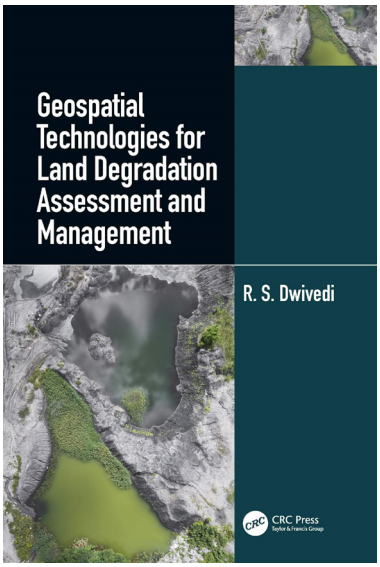

Geospatial Technologies for Land Degradation Assessment and Management

R. S. Dwivedi
CRC Press, Taylor and Francis Group, LLC Boca Raton FL
2019, xxiii and 391 pp., black and white figures, tables, index.
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Reviewed by Demetrio P. Zourarakis, PhD, GISP, CMS

Borrowing inspiration from a well-known agency motto, a better title for Dr. Dwivedi's book might have possibly been "Remote Sensing for a Sustainable Land." At a time in which concern about monitoring the nature, intensity, extent, and rates of land and soil changes reaches fever pitches, this book brings to the reader, a fusion of foundational knowledge of remote sensing and the opportunities this science and allied technologies present for successful application to the problem.

This book is a timely effort in the sense that it resonates intimately with the Sustainable Development Goals (SDGs) just fleshed out by the United Nations for their 2030 Agenda (https://sustainabledevelopment.un.org/topics/desertificationlanddegradationanddrought). In them desertification, drought, and land degradation processes are made an explicit target for remediation, prevention, and conservation efforts.

The unspoken but compelling premise of the book is that planetary health is synonymous with land health, which is in turn inextricably linked to soil health, even though these types of "health" are hard to measure and quantify. Thus, the terms "land" and "soil" are used interchangeably in the context of this book, both serving as substrate to a good portion of life on Earth. Dr. Dwivedi sets out to explore examples of the ways in which Earth-observing, remote sensing science and technologies can be applied to the problems of monitoring, detecting, modeling, mapping, and remediating negative changes in land and soils.

While the slant towards soil science and technology will satisfy readers with a background related to this specific domain, the book provides a bridge to a geospatial community by providing specific examples of sensor data exploitation and utilization. The perspective of both domains is thus enriched with a broader view and greater appeal by showcasing a diversity of remote sensing methods used to measure, monitor, and assess numerical indicators of land and soil health, for management purposes.

To illustrate the methodologies employed, the author chose for monitoring a sample of negative land and soil changes of interest, such as erosion, acidification, alkalinization and salinization. Desertification, vegetation degradation, and land loss to urbanization and industrial use are mentioned in the section on fundamentals of land degradation (Chapter 5). It would have been useful if the author had included examples of the effects of invasive species, and of the effects on shoreline changes due to sea/ocean rise, and due to the increasing frequency of violent storms.

Not unlike the structure followed by Dr. Dwivedi's previous book (*Remote Sensing of Soils*, 2017. Springer-Verlag, GmbH, Germany), the first four chapters take up 148 pages or 40% of the book and are devoted to providing a solid exposition of the fundamentals of remote sensing (i.e. Chapter 1—An Introduction to Geospatial Technology; Chapter 2—Passive Remote Sensing; Chapter 3—Active Remote Sensing; Chapter 4—Digital Image Processing). Chapters 5 through 10 cover the remaining 230 pages and they guide the reader through a sampler of land degradation processes (i.e. Chapter 5—An Introduction to Land Degradation; Chapter 6—Water Erosion; Chapter 7—Wind Erosion; Chapter 8—Soil Salinization and Alkalinization; Chapter 9—Soil Acidification; Chapter 10—Waterlogging; Chapter 11—Land Degradation due to Mining, Aquaculture, and Shifting Cultivation; Chapter 12—Drought). The effects of land use (i.e. mining, aquaculture and shifting cultivation) on land health are exemplified in Chapter 11.

The role played by global databases (i.e. big data) and the

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potentials for data mining using artificial intelligence, and machine and deep learning is addressed in Chapter 13—Land Degradation Information Systems.

Each chapter has a section on the basics of the land degradation process and an ulterior section on the role of remote - and sometimes proximal sensing, and on data exploitation workflows to generate numerical inputs ultimately translated into physical and chemical indicators - for use with descriptive and predictive biophysical-mathematical models specific to each process.

The book is well-written, with copious references offered at the end of each chapter. Rarely, a typo is found (e.g. Figure 11.6). For the benefit of readers, the term "annexure" should have been replaced with the more widely used term "annex". Surprisingly, some duplicated paragraphs occur (e.g. § 8.7.2.1.1.8 "Error Assessment" and § 9.5.2.1.7 "Accuracy Estimation"). The same information appears on Chapter 4 in Section 4.8. Some map figures appear distorted on Chapter 12.

This work provides a clear exposition on land and soil degradation processes occurring in select geographies for which remotely sensed data are ultimately used as inputs to numerical and stochastic models for mapping, describing and predicting the current extent and severity and the response to remediation, mitigation and conservation efforts.

This valuable book serves its best purpose when used as a primer in remote sensing for specialists in land and soil sciences, as it emphasizes how sensor data are generated, what types of data are generated and how measurements and information are derived for use in their domain. If the book were to be applied to the opposite crowd, it would introduce the Earth-observing remote sensing specialist to specific applications of his/her craft to the perennial but very timely and momentous topics of land and soil conservation and remediation.

GIS Tips & Tricks, *continued from page 528*

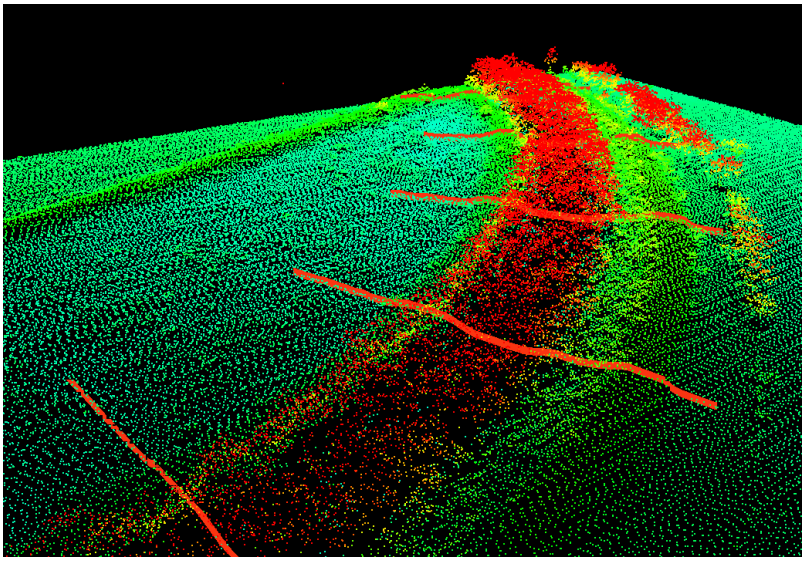

Figure 7.

2. Although the generated profile shapefile is in the coordinate system of the ArcGIS Map document, the exported shapefile will not have an associated .PRJ file. It is a good idea to use ArcGIS to add the projection file, and
3. Drawing a line graphic with the ArcGIS line graphic tool, will activate the "Export Profile by Selected Graphic" tool. Clicking on the "Export Profile by Selected Graphic" tool with the line graphic selected will invoke the same dialogs as the "Export Profile by Selected Feature" tool and perform the same tasks.

And there you have it.

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