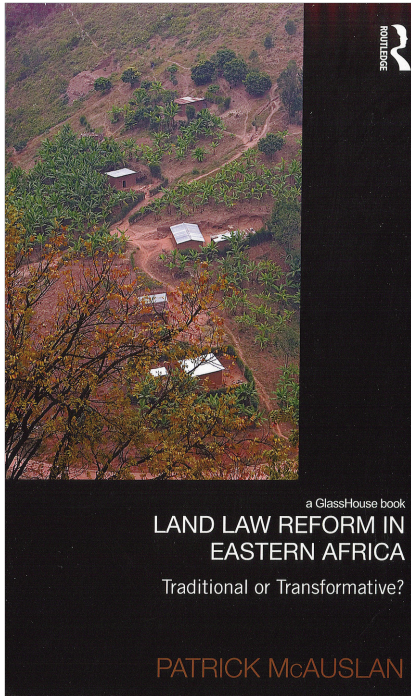# BOOK REVIEWS

Gerald McGrath

Land Law Reform in Eastern Africa: Traditional or Transformative? by Patrick McAuslan, 2013, Routledge Press, ISBN: 978-0-415-83143-7, 269 p. Hardback, $135.

The seven Eastern African jurisdictions discussed by author McAuslan are Kenya, Mozambique, Rwanda, Tanzania, Uganda, Somaliland and Zanzibar. The first five are independent countries. Zanzibar, politically a part of Tanzania but administered separately, has its own land laws. Somaliland (formerly the protectorate of British Somaliland) forms an autonomous region of Somalia as a self-declared but internationally unrecognized sovereign state. It has applied to join the Commonwealth of Nations (of which all of the five independent countries are members) under observer status.

The book's stated purpose is to provide a critical review of 50 years of land law reform in Eastern Africa,

1961-2011. A convenient appendix contains a list and brief description of the principal land laws enacted in each of the seven jurisdictions during that period, all of which have undertaken major reforms of their basic land law since 1990.

The author interprets transformative reform to mean changes in land laws that are intended to remove past economic and social injustices, and to ensure the redistribution of rights and opportunities for the benefit of those persons who have been disadvantaged or discriminated against by the previous legal regime. Essentially, transformative land reform attempts to redress the balance between those who have land rights and those who do not.

Traditional reform, on the other hand, accepts the colonial origins of Eastern African land laws and applies colonial and post-colonial solutions to the problems of tenure. Such reforms "operate within the existing social framework but leave the underlying injustices" untouched.

Because of a fallacious belief in the first few decades following the Second World War that sub-Saharan Africa possessed land that was plentiful and available to all, it was not considered to have an urgent need for land law reform, unlike more heavily populated countries in Asia and Latin America. A major change of attitude and policy occurred with the publication of a World Bank paper in 1975. Among its recommendations were the abandonment of communal tenure systems in favour of individual freehold titles and the subdivision of common land. It also emphasized the need to develop secure property rights to facilitate the operation of land markets. Twenty-five years later, however, it came to be recognized that communal tenure systems can be more cost effective than formal title and that individual land titling programmes should be judged on their equitable results as well as their efficiency.

A summary of the land laws of each jurisdiction at the time of its independence

shows that some of them, especially Kenya and Tanzania, maintained a dual land tenure system under which expatriate settlers and private corporations received a registered freehold title while the indigenous inhabitants occupied land under traditional customary tenure. The period of post-independence often saw the ownership of all land pass to the state and the conversion of existing freeholds to long-term leases. After its revolution in 1964 the government of Zanzibar declared the country's land to be public property and commenced a programme of free land distribution to individual citizens. Somaliland, which joined the Somali Republic (now Somalia) upon gaining independence in 1960, suffered a loss of its legal heritage when all the old British colonial statutes were deliberately destroyed and the law reports of the High Court disappeared.

Almost half the book is devoted to an examination of the land reform legislation that was been enacted by each jurisdiction after its independence, particularly since 1990. A common feature of these laws is the development or improvement of land registration systems, with an emphasis on individual title. The Rwandan Constitution of 1978 limits the scope of customary law by saying that it shall only be in force as long as it has not been replaced by a formal law. Mozambique's Land Law of 1997 is said to be one of the most advanced land laws on the African continent. Proposed amendments to the Uganda Land Act are expected to relieve what has been described as "chaos at the Land Registry". As well as providing security of title and facilitating the operation of the land market, titling projects are intended to eliminate or at least reduce ownership and boundary disputes. Yet a study undertaken in 1994 found that most such disputes

in Kenya occurred after the land adjudication and registration process.

With the partial exception of Kenya, all the jurisdictions under review have continued the colonial practice of top-down urban planning. One writer argues that "planning has been used to advance elite interests, deepening geographic and class inequalities". Post-independence planning laws ignore or reject in favour of the traditional authoritarian model the transformational approach to planning by the United Nations Human Settlements Program (UN-HABITAT) which is based in Nairobi and promotes socially and environmentally sustainable cities and towns throughout the world.

A topical chapter on gender and land reform concludes from the evidence that without constant pressure from women themselves, neither governments nor customary authorities or the international community will undertake the necessary action to improve their access to land. Women constitute 70% of the agricultural labour force but the majority of them do not own or control land.

The answer to the question whether or not land reform in Eastern Africa is traditional or transformative appears to be a qualified both. There remains a central government control of land management and ambivalence towards entrusting it to local authorities and rural peasantry. The post-1990 land law reforms are traditional, yet their details contain transformative elements.

The implementation of land law reform is expensive and requires a commitment on the part of government and civil servants, and support by members of the public. It also depends largely on financial contributions by donors who not unnaturally expect to play a major role in determining a recipient country's priorities.

Land Law Reform in Eastern Africa offers a wealth of scholarly analysis and informed opinion. Patrick McAuslan, a professor of law at Birkbeck College, University of London, draws on his wide experience as an international consultant to produce a very useful, well-researched study.

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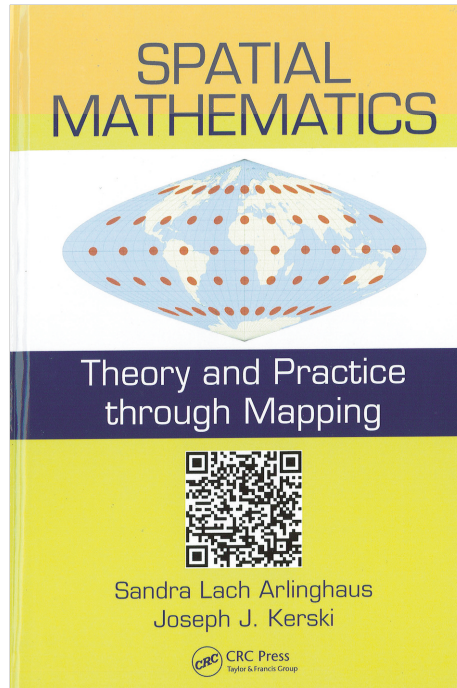
Spatial Mathematics: Theory and Practice through Mapping, by Sandra Lach Arlinghaus and Joseph J. Kerski, 2014, CRC Press, ISBN: 13:978-1-4665-0532-2, 272 p., Hardback, $99.95

This is a geography book with Spatial Mathematics interpreted as a foundational part of Spatial Science in which the geo-information is treated in three dimensions with possible time attributes. It is advertised as the first publication in a new series from CRC Press entitled Cartography, GIS, and Spatial Science: Theory and Practice, initially available only as hardback. However, the CRC website currently advertises a downloadable Vitalbook™ format edition for US$69 with rental rates starting at US$45 for 180 days.

The book includes ten chapters on mathematical geography topics with extensive discussions of practical applications using Google Earth and Esri's software. The prerequisites in terms of geography and mathematics are minimal, but some familiarity with the Internet, Google Earth and Esri's software is required. Quick Reference (QR) codes and URL links are used extensively to emphasize the availability of web reference material to complement the text.

Chapter One on Geometry of the Sphere introduces the spherical model of the Earth and coordinate systems for geo-referencing. The discussion of angular coordinates and mapping coordinates is essentially in terms of diagrams and graphics relying on Google Earth and Esri's software for technical details. The spherical model is then improved to an ellipsoidal one with the geoid being introduced as a surface of constant gravity [sic], idealized by the notion of mean sea level, … a theoretical level of the average height of the ocean's surface… which does not, however, correspond to the actual level of the sea at any given point at any instant in time, but is the halfway point between mean high and low tides [sic], on page 17. It is most unfortunate that this material was not proofread for technical accuracy.

Chapter Two on Location, Trigonometry, and Measurement of the Sphere starts with a discussion of absolute versus relative positioning or geo-referencing and goes on to Eratosthenes' (of Alexandria) estimation of the circumference of the Earth versus GPS simple applications. Conventional systems with acronyms such as DMS, DD, UTM, PLSS and MGRS are briefly introduced followed by some simple trigonometric applications.

Chapter Three on Transformations: Analysis and Raster/Vector Formats starts with the differences between one-to-one, one-to-many and many-to-many relations with examples of each in GIS. Then buffers and bisectors are overviewed for GIS applications. One interesting brief discussion about data fitness for some GIS applications mentions positional and attribute accuracy, logical consistency, completeness and lineage. With a few words about set operations, raster and vector formats are discussed along with their various

implied resolution characteristics. Practical GIS examples and exercises conclude the chapter.

Chapter Four on Replication of Results: Color and Number discusses the use of color in map design and specifically, hue, saturation and luminosity in the context of computer mapping. Some algebraic considerations of ratios and pixel characteristics are briefly overviewed for preserving image aspect ratios for purposes of replication. Again, Google and Esri's software are used to illustrate the concepts and applications.

Chapter Five on Scale very briefly overviews map scales and the unavoidable map generalizations. Then the rest of the chapter is on dot density maps for such data as census parameters and other similar data. The use of such dot densities is normally applied to equal-area map projections using some randomizing of the available data. Several illustrations using the TIGERweb service for U.S. census data and Esri's software are included with exercises.

Chapter Six on Partitioning of Data: Classification and Analysis starts with examples of data partitioning according to unit area in mapping (obviously problematic in non-equal area map projection). Classifications of data in terms of natural breaks, quantiles, and so on are then discussed briefly with examples. Normalizing data in terms of some attributes is discussed for relative qualitative geographical analysis, along with plenty of examples and exercises using Esri's software.

Chapter Seven on Visualizing Hierarchies is largely about hexagonal hierarchies in raster images. However, the definitions of hierarchies and lattices are incomplete in the mathematical sense in the text and the Glossary at the end, without proper referencing.

Chapter Eight on Distribution of Data: Selected Concepts covers a few concepts of proximity problems for the optimal location of emergency sirens in an urban neighbourhood, without even mentioning their Delaunay triangulation or their dual Voronoi tessella-

tion. These concepts are very basic and fundamental in computational geometry and GIS for such problems. The second half of the chapter uses Esri's software with tornado and population data.

Chapter Nine on Map Projections describes the various types of map projections only with the bare minimum of details to use Esri's software. The (scale) distortions are illustrated using Tissot's indicatrices which are aptly applied with the ArcGIS software that supports some 4634 different map projections (as of the end of 2012). There are plenty of web references for the reader to pursue further studies.

Chapter Ten on Integrating Past, Present, and Future Approaches emphasizes that more research and development are expected in this new century by exploiting the wisdom of the past! On the theoretical level, apparently, the use of non-Euclidean geometry in mapping warrants more research and in terms of applications, optimal route definition and real-time navigation are highlighted as most promising…

A Glossary of technical words and expressions is also included. Unfortunately, these descriptions and definitions are incomplete and misleading in some cases, at least from a geomatics perspective. Hopefully, these shortcomings will be fixed before any future releases and editions.

More References, Further Reading, Related Materials and an Index are also included, and on the web, *http://www-personal.umich.edu/~sarhaus/SpatialMathematics/index.html* which has updates on the text and references.

In conclusion, this colourful book should be useful for complementing technical geography lectures using Google Earth and Esri's software explorations in view of attracting high-school and general science students to spatial geography and computer mapping. For some geomatics professionals, the software applications would be informative. An e-book version would definitely be advisable for general accessibility.

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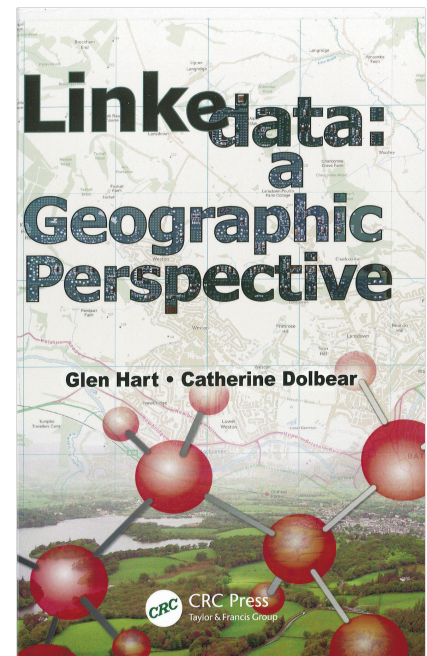
Linked Data: A Geographic Perspective, by Glen Hart and Catherine Dolbear, 2013, CRC Press, ISBN: 9781439869956, 280 p, Hardback, $119.95

Anybody interested in how geographical information can be used to combine and access datasets and information in the Web should read this book. This text introduces developments in the Semantic Web and Linked Data, and offers guidance how to implement Geographic Information as Linked Data. The book's goal is to explain how Geographic Information can be made more accessible and useful through the application of Semantic Web technology.

The Semantic Web is an extension of the Web. It enables people and machines to understand the meaning of the data on the Web more easily. Linked Data refers to a way of publishing and interlinking structured data on the Web. Geographic Information stands for any information with a geographical element.

The reader does not need to be an expert in the Semantic Web, Linked Data or Geographic Information to follow this text. Terms and concepts are explained in relatively easy to follow language, and the material is presented in a logically structured sequence.

Using an imaginary country, the island state of Merea, and a number of organizations within that country including Merea Maps as the imaginary national mapping agency, the book makes good use of examples to demonstrate ideas and solutions.

Having finished the text, readers will have added many new words, acronyms and concepts to their vocabulary. They will have gained significant new insights into how effectively and efficiently they might use geographic location to access and combine information on the Web. In specific terms, they will have been introduced to new insights concerning web-based navigation and use of topographic maps, gazetteers, geocoded lists of places and addresses, terrain models, photographs and remotely sensed imagery.

The first chapter offers a gentle beginning to understand the book's topic. Chapter Two introduces the Semantic Web and Linked Data starting with the historical evolution of both subjects, moving on to explain developments and how it all works, and finishing with recent trends and where things may be heading. Chapter Three introduces Geographic Information, including a summary of the history of its relationship with the Web, and notably its use for information integration. This chapter concludes with thoughts on Open Government Data. Having read the first three chapters, the reader is ready to engage in the subject central to the book, how Geographic Information, the Semantic Web and Linked Data can be combined to make significant advances in web-based information access and use.

Chapter Four starts to combine the three topics. It sets out the general technical principles required to represent Geographic Information on the Semantic Web. The chapter warns those readers familiar with traditional approaches to handling Geographic Information that they may need to clear their heads and be willing to embrace fresh approaches. This is because the traditional "GI-centric" view of the world, which placed Geographic Information at the "hub", is replaced by an approach that views Geographic Information as the glue in the background that binds it all together.

Chapter Five gets into the nitty-gritty. Here the reader is introduced to the Resource Description Framework (RDF), a standardized way of encoding data for the Semantic Web. Chapters Six and Seven go into more detail. The reader learns how to encode Geographic Information as Linked Data, and how to publish, query and link it on the Linked Data Web. It is unlikely that these three chapters will be read in one sitting. A lot of material is covered, with Chapter Seven demonstrating applications and ideas using the fictitious nation of Merea as the case study. The reader may find it useful on occasion to take time out to go to other sources to consolidate what he or she has learned about specific concepts or technologies introduced in this book.

Chapter Eight goes into more detail why organizations dealing with Geographic Information should invest in Linked Data when publishing on the Web. Throughout this chapter a number of limitations are identified with using the Resource Description Framework schema. Limitations focus notably on the knowledge required to really know whether and when two things are the same, or what relationship exists between them. This leads into an introduction in Chapter Nine of an alternative method of encoding more nuanced information in ontologies, using the OWL Web Ontology Language. Chapter Ten moves on to give examples demonstrating how certain key characteristics of Geographic Information can be ontologically described, including those dealing with vagueness, imprecision and insufficient data.

The book concludes with a chapter reflecting on the future of data integration in an open world. The reader is advised that while Geography and the Semantic Web can link up to be very powerful in connecting and accessing information through shared location and identity, this is not the definitive cure-all.

Glen Hart and Catherine Dolbear deserve to be complimented on how they have approached this subject matter, and for their ability to present the material in an engaging style that is reasonably straightforward to follow. Anybody who needs to understand how to work with Geographic Information should think of this book as mandatory reading.

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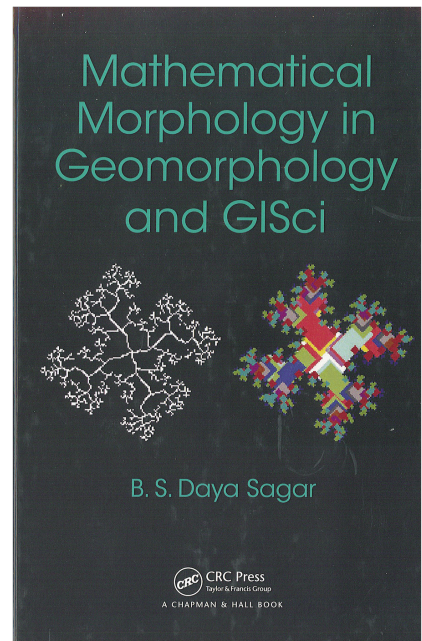
Mathematical Morphology in Geomorphology and GISci, by Behara Seshadri Daya Sagar, 2013, Chapman and Hall/CRC, ISBN 9781439872000, 516 p, Hardback, $99.95

Jean Serra in the Foreword to this book states that it is intended for an audience of "geomorphologists" while Arthur Cracknell in the Afterword suggests that it will be of "immense value" to postgraduates, doctoral and postdoctoral students. But if this is so, the intended readers will have to be exceptionally, mathematically erudite and adept at programming as well, for although Sagar provides an introduction to his version of mathematical morphology, no computer code, pseudo or otherwise, is included in the text. Sagar's audience may well be geomorphologists

but he frequently cites the work of human geographers. Consequently, this text will be of great interest to all scientists who believe that space can be utilized as a powerful explanatory variable.

Chapter 1 describes the general organization of the book and includes a synopsis of each of the 13 remaining chapters. Chapter 2 explains the various concepts behind mathematical morphology, both binary and multi-scale operations, that were originally introduced by Georges Matheron in 1975 and then further developed by Jean Sagar and others. The third chapter describes the diverse data sets amenable to investigation using the techniques of mathematical morphology. These include simulated and actual Digital Elevation Models, Digital Bathymetric Maps, fractal basins that exhibit self-similarity and indeed any remotely sensed image displayed as a numerical array. Fractal basins can be decomposed into topologically prominent regions but, as usual, William Warntz' seminal contributions to the determination of the critical points, lines and areas of a surface are overlooked [*Waters*, 2009]. Feature extraction, covered in Chapter 4, is a topic of interest to physical and human geographers, for the feature concerned might be a watershed or a commuting district, a river or a road. The segmentation algorithm described on p.80 does reference Warntz' concept of peaks and pits but not the passes and pales and other critical features that are equally useful in surface segmentation.

Sagar's primary focus on geomorphological applications is asserted in Chapter 5 where he demonstrates the use of the techniques of mathematical morphology for terrestrial surface characterization. Here he builds upon the pioneering research of Horton and Strahler. The stream order models developed by Horton and revised by Strahler are shown to have a fractal structure and therefore to be scale invariant. In addition, Sagar references Shreve's 1967 paper but Shreve's iconoclastic article [*Shreve*

1966] from a year earlier demonstrated that "the law of stream numbers is indeed largely a consequence of random development of channel networks according to the laws of chance". Thus, by and of themselves, these "laws" yield little geomorphological insight. Scaling Laws are the focus of Chapter 6 (and also Chapter 7) but these too have been shown to have little explanatory power unless they are supported by other lines of evidence (see the literature reviewed in *Waters*, 2013). Sagar does an excellent job of reviewing research from the early days right up until the most recent contributions including his own extensive oeuvre, and thus it was pleasant to see both Mike Kirkby and Adrian Scheidegger's work being cited (even if the Scheidegger reference has a few errors). References to the work of Mark Melton and Richard Chorley on morphological systems are, unfortunately, conspicuous by their absence.

Particularly innovative is the discussion of spatial-temporal dynamics in Chapter 9, where Sagar has made extensive and seminal contributions. It would have been reassuring to see an in-depth account of the limitations of these approaches, especially the concepts of equi-finality, or convergence, where different system trajectories may result in the same end state or the converse of this, multi-finality or divergence, where the same initial conditions can result in a variety of end states [*Skyttner*, 2005, p.54]. The methodologies introduced here are illustrated with applications to sand dune avalanches and flood water dynamics. The final chapters of the book discuss Spatial Relationships and Spatial Reasoning (Chapter 10), Derivation of Spatially Significant Zones from a Cluster (Chapter 11), Directional Spatial Relationships (Chapter 12), the intriguing concept of Between Space (Chapter 13) and Spatial Interpolation (Chapter 14). As these chapters cite the work of Mike Batty, Mike Goodchild, Bob McMaster and Alan Wilson, among others, they are likely to be of considerable interest to the community of human geographers.

A small quibble: Sagar provides a list of symbols and notations, three pages long, but no such summary of the acronyms used in the book.

This reviewer's overall assessment is that this book is a truly remarkable contribution that is likely to make a significant impact in the GISci community far beyond its primary target audience of geomorphologists. *Mathematical Morphology in Geomorphology and GISci* is also a celebration of the remarkably innovative contributions of Daya Sagar over the last two decades.

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NIGEL WATERS

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