
PREFACE

WHAT SETS THIS BOOK APART?

The sixth edition of *Cartography: Thematic Map Design* is a completely revised version of previous editions. While the focus remains on the principles of thematic map design, all chapters are updated, now providing a more integrated, practical link between cartographic theory and practice for users of GIS, computer mapping, and graphic design software. The goal of this new edition is to provide an in-depth discussion of the process of designing maps for displaying spatial information.

THE APPROACH OF THIS BOOK

The intended audience of this text is rather broad based. It includes instructors and students of higher education classes in cartography focusing on the design and creation of thematic maps. Both instructors and students will appreciate the straightforward presentation of material, including over 120 newly designed graphics and map examples, as well as the authors' suggestions for the *do's* and *don'ts* of map design. Other users include a range from cartographic professionals to novice users of software that produce maps. For those professionals who wish to have a modern reference book to which they can turn for review of thematic map design principles, this text will serve them well. The book is written in user-friendly language that even the most novice generator of maps can easily follow. It is especially beneficial to those individuals who wish an understanding of map design that goes beyond the use of software default settings. This text will provide each user with an overview of cartographic design of thematic maps based upon the three authors' combined professional and academic experience of over fifty years.

The text's 17 chapters are presented in five parts, each of which has a focus that bonds the chapters together. Users of the previous edition of the text will notice that the chapter on Geographic Information Systems has been removed since the text is now GIS-friendly throughout. Chapter 16, Introduction to Virtual and Web Mapping, is entirely new to the

sixth edition, and replaces the fifth edition's Chapter 17. In addition, a number of topics have been consolidated differently which permits the pedagogical approach familiar to many courses in thematic map design. For example, the topic of data classification has been moved into Chapter 5, Descriptive Statistics and Data Classification, since classification can be applied to other mapping techniques as well. While some of the major points and changes are highlighted in this preface, readers for whom those changes from the fifth edition are important (such as instructors) are encouraged to examine the outline for each chapter in the text's table of contents for more specific details.

WHAT'S NEW IN THE SIXTH EDITION?

This sixth edition has retained the focus on excellence in the principles of thematic map *design*. At the same time, this edition has undergone important revisions providing

- a more integrated, practical link between cartographic theory and practice for users of GIS, computer mapping, and graphic design software;
- an improved internal organization within the chapters;
- a NEW chapter on virtual and web mapping (Chapter 16);
- many NEW and updated maps and graphics; and
- an EXPANDED Color Plate section with new map examples illustrating practical cartographic design principles.

DETAILED CONTENT COVERAGE

The five chapters in Part I provide a foundation for thematic mapping. **Chapter 1** presents the underpinnings of thematic cartography, including discussion of the various kinds of maps including qualitative and quantitative thematic maps, map communication and visualization, and other topics. New additions include a brief taxonomy of thematic map types, a preview of the basic map elements, and a discussion on the use of GIS, mapping, and artistic drawing software. The chapter

concludes with a presentation on cartographic abstraction and generalization and a discussion on ethics in cartography.

Chapters 2 and 3 are still the “projection chapters” but have been reorganized and rewritten with digital map compilation in mind. **Chapter 2** explores basic geodesy, coordinate systems, and scale. Included is a discussion of reference ellipsoids, datum concepts, and a presentation on the positional shifts of boundaries with the conversion from North American Datum 1927 (NAD27) to NAD83. The coordinate system section includes an expanded discussion of decimal degrees. The chapter concludes by revisiting scale and its impact on line generalization in digital boundaries. **Chapter 3** examines the map projection process, with particular attention paid to projections and projection parameter terminology included in most software, and addresses the often confusing concept of GIS “projection on the fly.” A substantial new component of this chapter includes the addition of the UTM coordinate system and an updated discussion of the State Plane coordinate system, with a number of new figures illustrating each. The chapter concludes with a new discussion on the impact of modifying the standard parallels and central meridians, which can produce greater accuracy and an improved aesthetic look to the map.

Chapters 4 and 5 examine the nature and classification of data. In **Chapter 4**, spreadsheet examples are used to visualize the spatial characteristics and attributes of location. Data are characterized by their location (point, line, and area) and by their form. The chapter discusses data based on the characteristic view (qualitative versus quantitative), spatial view (discrete versus continuous), and attribute view (totals versus derived). The cartographer maps data and frequently manipulates and transforms data from one form or measurement scaling to another. The relationship between data, map symbology, and thematic map type is presented in a concise table that enables the user to translate between data and the visual variables of map symbolization. Chapter 4 concludes with an examination of data sources, GIS clearinghouses, and the United States Census Bureau and Geological Survey. The reader is presented with a discussion of cartographic errors that can occur when matching attribute data to location using FIPS codes. **Chapter 5** examines the descriptive statistics of associated data without presenting information common to textbooks in statistics. What is reviewed is an overview of a data set and how the characteristics of the data distribution can be used in data classification. Nine data classification schemes are examined prior to linking them with a particular map form. A summary and comparison of the major classification techniques is presented using a common data set. Tables of the data legends and a discussion of advantages and disadvantages of the schemes provide an overview of the techniques. The user is cautioned about potential problems encountered when data sets contain voids, no data designations, zeros, and the impact of outlier extremes.

Part II examines in six chapters the techniques of quantitative thematic mapping. Although the internal revisions to each chapter are substantial, the ordering of this section will

be familiar to users of previous editions. The techniques discussed include: choropleth mapping (**Chapter 6**), dot density mapping (**Chapter 7**), proportional symbol mapping (**Chapter 8**), isarithmic and surface mapping (**Chapter 9**), value-by-area or cartogram mapping (**Chapter 10**), and flow mapping (**Chapter 11**). The most dramatic structural change within this section is the moving of the classification techniques from the choropleth mapping chapter to Chapter 5, as noted previously. Since classification is so integral to the choropleth technique, there is a new discussion of comparison of classification methods as applied to choropleth mapping within Chapter 6. Two other important changes can be inferred in the modification of chapter titles from the fifth edition. In Chapter 7 (dot density mapping), we place a greater emphasis on mapping total data within enumeration units. In Chapter 9 (isarithmic and surface mapping), the discussion has been expanded to include various surfaces. In all of the chapters in Part II we stressed the importance of appropriate data associated with each technique. In the section’s conclusion at the end of Chapter 11, the importance of selecting the mapping technique based on the type of data that will be used in the map is emphasized.

Part III looks at the map from the standpoint of its overall design, the type used to communicate information, and the use of color for data visualization and aesthetic appeal. **Chapter 12** provides ideas for total map organization and figure-ground relationships. Of the visual design ideas discussed in this book, an approach to a design problem by way of having a visual hierarchy plan is the most fundamental and necessary. The design approach taken in this part specifically targets the page size map in terms of organization of the visual elements, contrast, and visual acuity. The selection and use of type on the map is the focus of **Chapter 13**. A series of rules to follow in deciding type placement and positioning is provided with a series of graphic examples of how to and how not to label the map. **Chapter 14** is completely redesigned and examines the principles of color for thematic mapping. The additive and subtractive color theories are applied to both the printed map and also the map viewed on the computer monitor. Six color models are examined and their applications are explored, specifically in terms of colors selected for mapping on the Web. The chapter concludes with an examination of color in design especially for developing figure-ground associations.

Immediately following the chapters on design, type, and applications of color, Part IV examines the production of maps in both the hardcopy, **Chapter 15**, and virtual environments, **Chapter 16**. Color plays an important role in both of these procedures. Desktop printers are examined as the standard mode of cartographic production for a small number of copies. For larger quantities, the printing press plays both its traditional role for sheet-fed and web presses that use printing plates and offset lithography, as well as the use of digital printing for direct to press technology. The map production process is laid out in a six-step process that follows the map from design and layout to post-press operations.

Chapter 16, a totally new chapter in the sixth edition, explores virtual and web mapping techniques. Both raster and vector graphic formats and structures are examined including the popular file formats, such as TIFF, JPG, GIF, SVG, EPS, PDF, and others. Key Internet concepts are presented, as well as the design constraints imposed by screen resolutions. Map animation, map interactivity, and cybercartography are also explored as possible solutions to the virtual presentation of maps.

Part V contains a single chapter devoted to the development and design of effective graphs. Graphs are also a product of GIS, mapping, and artistic software. Just as with maps, there are guidelines that should be followed to generate a well-designed graph that communicates the data. Graphs that are both simple and complex, that have two or three axes or no axis at all, are explored in **Chapter 17**.

KEY FEATURES

Study Aids

- Key terms set in bold where they first appear, and defined in the Glossary at the end of each chapter
- End-of-chapter selected references
- End-of-chapter glossary

Color Plate Section

16-page Color Plate section showing 4-color images

Appendices

- Appendix A: Worked Problems
- Appendix B: Georgia Data

TEACHING AND LEARNING SUPPLEMENTS

For Instructors

Website at <http://www.mhhe.com/dent6e>

The **Cartography: Thematic Map Design** website offers a wealth of teaching and learning aids for instructors. Instructors will appreciate:

- an online Laboratory Manual containing practical, hands-on ArcGIS exercises
- sample completed maps and answers to accompany the online lab manual exercises
- access to the online **Presentation Center** including illustrations, photographs, and tables from the text in convenient jpg and PowerPoint format

Electronic Textbook

CourseSmart is a new way for faculty to find and review eTextbooks. It's also a great option for students who are

interested in accessing their course materials digitally and saving money. CourseSmart offers thousands of the most commonly adopted textbooks across hundreds of courses from a wide variety of higher education publishers. It is the only place for faculty to review and compare the full text of a textbook online, providing immediate access without the environmental impact of requesting a print exam copy. At CourseSmart, students can save up to 50% off the cost of a print book, reduce their impact on the environment, and gain access to powerful web tools for learning including full text search, notes and highlighting, and email tools for sharing notes between classmates. Visit www.CourseSmart.com

For Students

Website at <http://www.mhhe.com/dent6e>

The **Cartography: Thematic Map Design** website offers a wealth of study aids for students, including:

- chapter outlines
- an online lab manual containing practical, hands-on ArcGIS exercises
- career opportunities
- links to professional organizations
- links to cartography-related topics

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This edition bears much of the cartographic philosophy of the late Borden D. Dent. We greatly appreciate his contributions to this book.

All graphics in this book were created using one or more of the following software: ArcGIS™ Desktop 9.2 including ESRI Data and Maps, and ArcView™ 3.3, both registered trademarks of the ESRI Corporation; Golden Software's MapViewer™, Surfer™ and Grapher™ by Golden Software, Inc.; Adobe Illustrator™ and Photoshop™ by the Adobe Corporation; and Microsoft's Excel™ and Word™ software. Many of the software have been mentioned in the text without the trademark notation but that registration is noted here.

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