

data, for example) which, although not wholly satisfactory for analyses at this scale, could supply data with which to address some of these issues. The section on benchmarking, while interesting, is far too abbreviated to be of use to those interested in applying these techniques to the planning or evaluation of regional health care delivery systems.

These criticisms notwithstanding, this atlas is a monumental accomplishment which all practitioners of health services research or medical geography will wish to examine. Geography and map libraries should definitely add this volume to their holdings, and will find the hardcover edition consulted frequently. Spatial data repositories should consider acquiring the CD-ROMs with the detailed data used to generate the maps and graphics included in the atlas.

This reviewer looks forward to the linkage of spatial analyses of variations in health care delivery to decision-making by health care organizations, insurers, policy-makers and health services researchers, and to expanded and updated future editions of this atlas.

**Mapping an Empire: The Geographical Construction of British India, 1765-1843.** Matthew H. Edney. Chicago: University of Chicago Press, 1997. Pp. xv + 340, maps, references, biographical notes, and index. \$35.00 hardback (ISBN 0-226-18487-0).

*Reviewed by:*  
Dr. W. Elizabeth Jepson  
Department of Geography  
University of California at Los Angeles

Enlightenment ideals, brute colonial realities, and practical bureaucratic negotiations collide in Matthew Edney's history of cartographic practice during late eighteenth and early nineteenth-century

British imperial expansion in South Asia. Considering recent studies on the duplicitous role of geography in European colonialism, it is not surprising that Matthew Edney has closely investigated cartography in British India. His contribution to the study of geography and empire is to present a sophisticated explanation of mapmaking in British India as a cultural, political, and historical product. Rather than a ubiquitous tool for empire, mapmaking in the divided bureaucratic context was confined, often contradictory, and incomplete. The author's narrative brilliantly synthesizes text and context—map and motive—to tell a story of how the British mapping of India was contingent on a variety of competing practical and ideological interests. Throughout this book, Edney deploys a rigorous theoretical analysis on voluminous archival material to illustrate the central theme in *Mapping an Empire*: A tension between Enlightenment epistemological ideals of observation and notions of representation were manifested through the actual practices of survey and mapmaking "on the spot." Moreover, this cartographic project based on intersecting ideologies of colonialism and contradictory ideals of science was mediated through colonial institutional negotiation and historical contingencies.

The first section of *Mapping an Empire*, Edney draws from many empirical examples to outline how overarching Enlightenment ideas and cultural expectations of "science" influenced colonial practices of mapmaking in the early years of British colonialism in South Asia. For example, the reports by "peripatetic officers" surveying the Indian landscape, such as Colin Mackenzie's Survey of Mysore (1800-1801) and Francis Buchanan's Bengal survey (1807-1814), attempted to achieve the ideal of taking a complete inventory. Survey of town locations, land resources, and rivers, descriptions

of language and religion, social and economic information, mineralogical, botanical and zoological inventories were predicated on the notion that the surveyor could achieve a complete scientific understanding of the landscape through this implicitly cartographic and visual framework. According to Edney, observation and reason provided a "powerful rhetoric of vision, empiricism, and presence" that buttressed the scientific authority of imperial cartography (p.75). This cultural and ideological expectation that science must be a rational process of compilation set the groundwork for the construction of what Edney names as the geographical "archive." This "archive" includes representations, images, narratives, and maps assembled and ordered that underpinned the larger cultural process of colonialism.

Scientific expectation also framed the conceptual scope, process and practice of colonial mapmaking. Edney illustrates how the British understood vision and observation in the scientific process. He argues that scientific investigation was an exercise of power, explains how the picturesque landscape aesthetic fashioned images of South Asia, and outlines how an implicit cartographic framework structured geographical narratives that contributed to the colonial archive. Emphasizing the cultural and scientific influence of the cartographic perspective on more general imperial information gathering activities, the author observes that "geographical observation implicitly constructs new knowledge based on the spatial and distribution of phenomena, in which respect is firmly rooted in the map and mapmaking, but observation itself is part of the larger knowledge discourses constituted by texts, maps, images, and statistical censuses" (p. 46). Through his broad overview of British cartographic history in South Asia, Edney sup-



ports the notion that knowledge is intimately linked to power, but he grounds this perspective on detailed discussion based on the specifics of British colonialism in South Asia.

Edney connects these scientific ideals to imperial realities and moves his analysis from how geographical perspectives fashioned images of South Asia to how surveys and cartography were used to "discipline" the Indian landscape. Statistical, astronomical, and route surveys formed the backbone of colonial cartographic knowledge. However, for eighteenth-century colonial administrators, the potential of the survey was only realized when it was incorporated into a larger knowledge base, reconciled with multiple geographical sources, and systematically reconstituted in a single encyclopedic cartographic archive. Yet, according to scientific expectations, the information was obtained only through the inchoate and imperfect vision of the surveyor. For the cartographic project to progress scientifically, the surveyors needed to find new, more comprehensive and "rational" methods of mapping the empire. What Edney emphasizes is that technological change to triangulation concomitantly transformed the practices of cartography in British India. The innovative trigonometrical survey provided the "technological fix" to the acknowledged imperfect, indirect, often ambiguous route surveys, descriptive topographies, and astronomical observations. Triangulation created a "rigorously structured space" supported by more accurately controlled measurements and provided the framework for more detailed surveys to be integrated at large scales. Trigonometrical surveys ordered cartographic space and disciplined the Indian landscape to European science. This new expensive and time-consuming cartographic method reduced the Indian landscape to a uniformed mathematical

framework and set in motion a geographical certitude that fostered, ironically, practical material and intellectual anarchy that became characteristic of British mapmaking in India.

The scientific and cultural ideals of cartography also met financial limits, logistical constraints, institutional inertia, and stochastic colonial realities. Conditions of the colonial administration circumscribed all efforts to coherently map India. The divided information management system, patronage, hierarchical decision-making apparatus, separation between governmental departments, lack of resources, and expanding need for geographical information all contributed to a chaotic practice of mapmaking. Moreover, these structural constraints exacerbated the tension between surveyors and Company cartographers in London offices who eventually compiled the multifarious surveys into the single vision of India. This permitted a "mini-hierarchy" of cartographic expertise to form. As Edney writes, "The surveyors worked at the boundary between the uppermost, British portion of the pyramid and the lower foundations staffed by Eurasians and Indians; the cartographers functioned close to the pinnacle of the pyramid, collecting data and disseminating maps downward as necessary" (p. 162).

Edney focuses on the Madras surveys (1790-1810) to best illustrate the contingent character of British cartography as both duplicitous in advancing British claims on indigenous resources and divided in its practice. Lack of administrative unity was the prevailing characteristic in the mapping of Madras. Different motives and visions of how to make an accurate and comprehensive map in accordance with scientific and cultural expectations characterized this era of mapmaking. Notable illustrations of this cartographic anarchy are Edney's discussion of Colin

Mackenzie's attempt at a systematic topographical survey, William Lambton's trigonometrical survey of India's eastern coast, and the inability of the government to create a single cartographic institution to coordinate a comprehensive survey of southern India. These enlightening examples illustrate how, through detailed archival research, one can empirically link internal administrative conflicts and financial constraints of cartographic practice to contested ideas in cartographic practice. Edney shatters the image of the ubiquitous colonial state unified in purpose, perspective, and practice. With sound empirical evidence, he shows that cultural expectation of "science" and social realities within the British colonial system had a profound effect on the construction of geographical knowledge.

The territorial expansion of British rule during the early nineteenth-century demanded a unified cartographic project to deal with increased governmental responsibilities. As a result, the British instituted the Great Trigonometrical Survey to support the publication of the *Atlas of India*. In the final chapters of *Mapping an Empire*, Edney writes a comprehensive history of this attempt to map "all of British India." The *Atlas of India* was intended to unify disparate topographical surveys based on a common "geometrical groundwork" of the Great Trigonometrical Survey of India (GTS). This framework that underpinned the *Atlas of India* "held the promise of a perfect geographical panopticon" to combine both geodetic science and general geography, thus reducing geographical data to a uniform reference (p. 319). The complexity of this section is found within the empirical examples of how the unified image of India developed historically within the changing requirements of colonial administration to rule their newly acquired territory. Edney's discussion on the Great



Trigonometrical Survey and its institutional development provides the reader with fundamental understanding how the character of British cartography in India was contingent on cost and, most of all, practical and ideological compromise.

Archival synthesis and lucid narrative of the ideological, historical, and technological processes of British mapmaking sets a new empirical and theoretical standard for both the history of cartography and South Asian colonial studies. *Mapping an Empire* takes the analysis of maps and power to a higher level of empirical precision and detail. He details cartographic practices and explains these within the context of colonial demand and constraint with the accuracy of a historian and precision of a cartographer. The cartographic specialist will appreciate how Edney brilliantly integrates a profound understanding of the practical process of mapmaking with voluminous archival material. His ability to expose important practical details of colonial mapmaking—from the problems with manpower, expense, and time limits—reinforces the broader theme that cartography is a highly contested process within divided colonial administration and limited resources. In *Mapping an Empire*, these logistical constraints are superimposed on the cultural expectations of science to show how the very fabric of geographical knowledge—the map—is socially and politically constituted. For the colonial historian or cultural geographer interested in questions of empire and geography, Edney demystifies the colonial state in the process of imperial expansion and brings into focus the role of individuals and colonial institutions that have profound effects on how the British proceeded to map India. *Mapping an Empire* is both a monumental contribution to the history of British colonialism and a necessary addition to the libraries of geographers

interested in the history of geographical thought.

**Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History.**

Blair Csuti, A. Jon Kimerling, Thomas A. O'Neil, Margaret M. Shaughnessy, Eleanor P. Gaines, and Manuela M. P. Huso. Corvallis: Oregon State University Press, 1997. 512 pages, 670 maps including full-color map insert, 442 illustrations. Hardbound, \$39.95. (ISBN 0-87071-395-7)

*Reviewed by James E. Meacham  
InfoGraphics Lab,  
Department of Geography  
University of Oregon  
Eugene, Oregon 97405-1251*

The *Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History* is a comprehensive publication featuring information on Oregon's 426 native terrestrial vertebrate species that breed in Oregon and 15 introduced species. In the heart of the atlas there are sections covering Amphibians, Reptiles, Breeding Birds, and Mammals, with a page dedicated to nearly each of the 441 species. Each page contains a two-color, 1:4,300,000 scale, range map with supporting textual information on Global Range, Habitat, Reproduction, Food Habits, Ecology, and other relevant facts. Reference to Order, Family, State and Federal Status, Global and State Rank and Species Length are also listed. Each page contains a finely created line-drawing of the featured animal. The maps display the probable ranges where each wildlife species could be found, using shaded relief and county boundaries as spatial reference. Csuti states, "The maps presented here serve as a guide to habitats and general distribution of each species." The breadth and depth of the information on wildlife presented in this atlas is evidence of a major collaborative effort. Many organizations are listed in the acknowledgments. The key contribut-

ing agencies include the National Biological Service, Oregon Department of Fish and Wildlife (ODFW), U.S. Environmental Protection Agency, Oregon Natural Heritage Program, and the Geosciences Department at Oregon State University.

The Atlas is well-organized with an extensive Introduction describing Oregon's wildlife and the methods used in compiling the range information. This section also includes a description of each of the 30 identified wildlife habitats of Oregon. Reference maps displaying the major transportation network, cities, and counties are conveniently located just before the species range maps. The atlas contains a glossary, an extensive reference section, a though index, and three appendices; (I) Checklist of Terrestrial Breeding Vertebrates, (II) Checklist of Wintering Birds, and (III) Winter Bird Distribution Maps.

The process used for the creation of most of the range maps started with the creation of a vegetation cover map derived from Landsat image interpretation. These vegetation cover types were then clustered into wildlife habitats based on habitation by similar groups of species. A full-color 1:750,000 scale Oregon Wildlife Habitat Map insert displays the habitat types and the

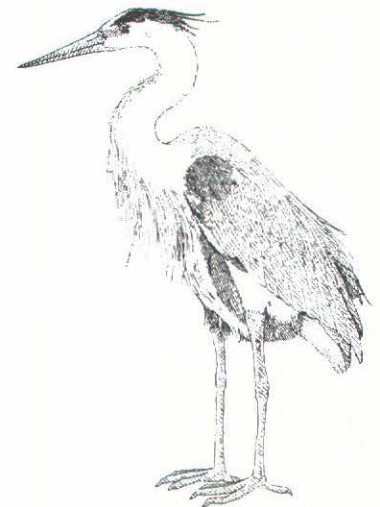


Figure 1. Great Blue Heron