MERIDIAN

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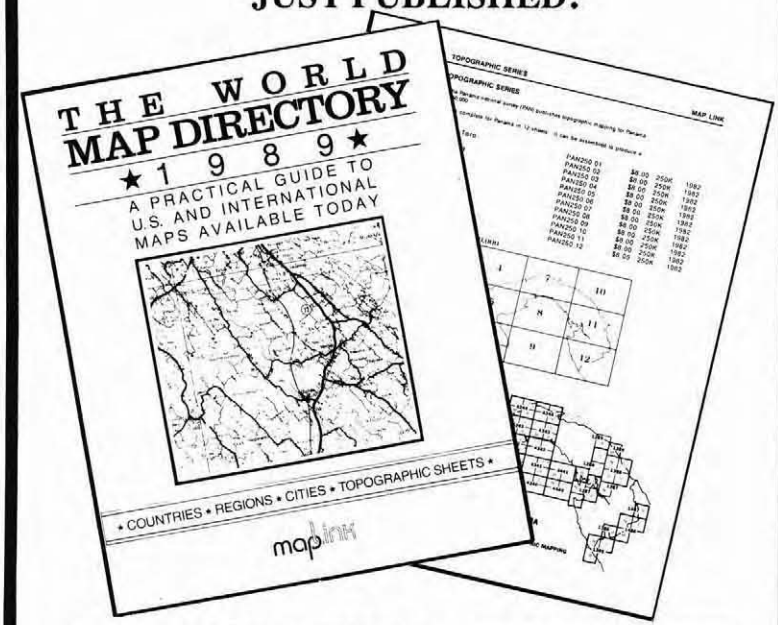

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MERIDIAN
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Looking back ... and ahead ...

It is clear that "the map business" is a growth industry. While many other human activities encourage the use and the development of maps, nothing promotes map use like a war. It is not just that military operations cannot be carried out—and reported—without maps. The quest for geographic information encourages a myriad of hucksters and information charlatons who hawk their wares with preposterous claims. Their products, generally overpriced and often so poorly designed and produced that they are an insult to the cartographic community at large, fill the shelves in the bookstores.

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Unwary and uninformed, unsophisticated users buy this stuff, and someone makes a buck. On the other hand, over 20,000 image maps of Kuwait City were distributed by Intergraph, produced using "the latest" in cartographic production techniques.

Cartography has also become notorious elsewhere. There is the growing tide of exhibits devoted to and in anticipation of the 500th anniversary of the Columbian encounter. We can all learn from "The Shape of the World"—and hope that the videotapes, book and teaching materials will find utility and that, as a result, a more cartographically aware generation will emerge. These six hours and book have been accompanied by a number of articles and reports in the media devoted to "the new cartography." Cartography is in *Newsweek*; it is in *U. S. News and World Report*. A book about maps was reviewed in *The New York Times*. On the other hand, even where higher quality mapping might be expected, error does occur; note, for example, on the network news the rotating sphere on which an interrupted Van der Grinten projection (or something like that) has been projected.

The environment will, increasingly, be understood and managed by the digital data base. Subsuming the role which the printed map sheet has held for centuries, paths will be plotted, landscapes developed, and the world understood using the technology of business, industry and government. There were printed maps and data tables reporting the 1970 census; in the 1980s these were replaced by microfiche; in the 1990s there are the data disks. These three different user-available formats have a number of common attributes, including not only the data base and the errors but also the eager corps of users. Cartographers, having recognized only too recently the need for "communicative design," will be less significant in organizing the user interface—the graphic display—than technologically-oriented (and altogether too often cartographically illiterate) practitioners. The maps—images in many forms—will be there and the need to promote literacy and encourage logic will, as never before, be paramount. The map has altogether too often been seen as authoritative, and believable, and valid, regardless of who made it. As in desktop publishing, anyone can be an author, a designer, and a publisher. Unfortunately too many are re-inventing maps as spatial displays of data, errors and all. They ignore the legacy of graphic logic and design, they are oblivious to principles of data handling and presumably fail to understand the nature of the map, and they are unaware of the capabilities and limitations of map users.

An exaggerated problem? After all, the job gets done, with the map (though badly designed and produced) doing its part, and the user is satisfied. It is a complex problem, one far from resolution.

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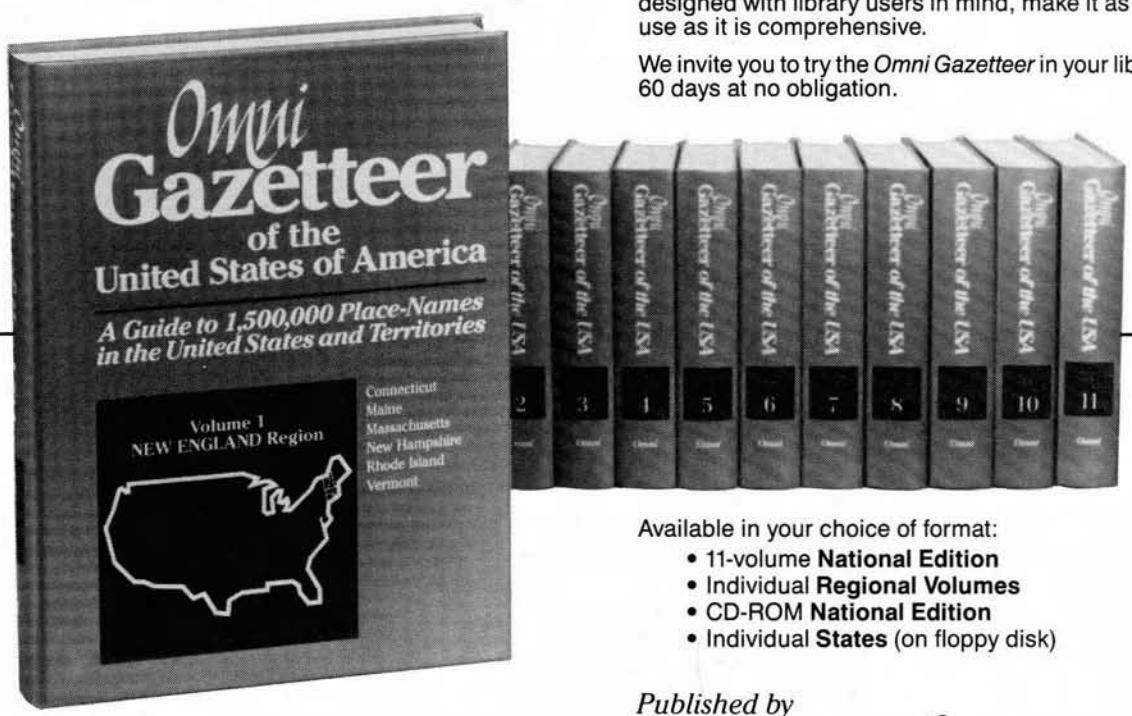

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We have received letters both pro and con about *Meridian 5*. In some cases we seem to have been helpful, and one reader commented that several articles had been "most useful to me in helping to formulate a vision of what our map collection's future should be." Alternatively, "I really enjoyed the article by Gary North. I thought some of the other articles were too short and perhaps not very substantive. Others were extremely good."

Russell Guy (of Geoscience Resources) points out that we should have devoted some attention to GeoCenter and Edward Stanford as well as to Geoscience Resources and the International Map Dealers Association. These, and other map dealers were not covered in our discussions of the commercial sector and its role in promoting the use of maps and spatial data. We agree; we should have. We apologize but feel it important to point out that we overlooked other potential contributors in the commercial, academic and institutional sectors as well. But, as *Meridian 5* emerged, it got larger and larger, and later and later. We apologize for our sins of omission, as well as those of commission. Looking ahead, we find that the Groupe des Cartothéquaires de Ligue des Bibliothéques Européennes de Recherche will have as a theme at their October 1992 meeting (in Barcelona) the "Diffusion and Promotion of Cartographic Materials."

If maps and environmental experiences span a wide range, from the simple and realistic to the abstract and even unimaginable, the variety in possible scholarship is equally diverse. One goal of *Meridian 6* is to exploit this diversity. To that end, we present a forum (four experts address four issues which confront the map business, but particularly map librarians, today). There is an exploration of the role of "other images," of the drawings, paintings and photographs which explore facets of the environment that cannot be handled effectively by maps. The reader can compare the focused program of collecting in a new historical cartography library with the data gathering and organization of a GIS network; while the traditional program of the Center for Historical Cartography at the University of Texas at Arlington is understandable, the sheer technological cliff being assaulted by the LCGISN seems to provide a major barrier to comprehension.

The map business is too extensive, too diverse and too changeable; we cannot lock *Meridian* into a single format or a narrow perspective. *Meridian 5* will not be a model for future issues, either in length or in content. *Meridian 6* should make that obvious.

If literacy, "the library legacy," helped "immigrants access America" (Deanna B. Marcum and Elizabeth W. Stone, 1991. *American Libraries* 22:202–205), then geographic literacy must continue to be at the forefront of our activities. "... Librarians ... concentrated on the purpose of libraries and struggled to provide the services those groups of people [immigrants] so badly needed to familiarize themselves with their new native land. Those examples should serve to inspire those undertaking literary programs ... today." Only by understanding will we be able to help others use maps to deal with environmental issues, and these issues extend beyond those of understanding and navigating through the physical realm to comprehending more effectively the myriad of enigmatic cultures with whom we come into increasingly frequent contact.

We appreciate the effort not only of our contributors, but also of our reviewers and referees. The suggestions of J. B. Post, George Kurian and Frances Herbert, as well as those of others who corresponded, are gratefully acknowledged.

George F. McCleary, Jr.

INFORMATION FOR CONTRIBUTORS

Meridian is published semi-annually by the American Library Association's Map and Geography Round Table. It contains articles which advance the organization and dissemination of cartographic, geographic, and remote sensing information collections; and describe and document the trends and issues in cartographic and geographic librarianship. Persons interested in the objectives of the Map and Geography Round Table are invited to submit manuscripts to the Editorial Board for consideration. Full-length manuscripts as well as shorter commentaries, research notes and letters should be addressed to:

George F. McCleary, Jr.,
Department of Geography,
University of Kansas,
Lawrence, Kansas 66045–2121.
Telephone 913–864–5540.
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Electronic Geographic Information in Libraries

Some Concerns and Insights from Four Experts

Patrick McGlamery
University of Connecticut
with Kate Beard, Donald F. Cooke, Susan Klimley and Joel Morrison

For many of us, digital cartography is a *terra incognita*, an unknown.

Terra incognita, the Unknown, is the stock-in-trade of map makers and map keepers. "What is it like there? What is the lay of the land? Will I need any special equipment? Do I need to learn a language?" These typical questions are asked either outright or subliminally by users of the Map Room. For many of us, digital cartography is a *terra incognita*, an unknown. We are asking many of the same types of questions. Wall map, globe, topo, chart, aerial photo, CD-ROM! Is it a map? How is it similar to, or different from a paper map? Map libraries have collected an array of electronic media. In fact, it is often the largest and most diverse in the library. Electronic maps are slowly creeping into libraries, and we are expected to incorporate yet another kind of map.

With electronic information we are dealing with information in a totally new form. It is a form dependent on machinery and codified instructions: hardware and software. The last time information underwent such a

Kate Beard is an assistant professor in the Department of Surveying Engineering at the University of Maine and a member of the research faculty of the National Center for Geographic Information and Analysis (NCGIA). Her current research with NCGIA focuses on multiple representations of spatial data at different resolutions and visualization of spatial data quality by decision makers.

Donald F. Cooke, the founder and President of Geographic Data Technology, Inc. was a member of the New Haven Census Use Study Research Group that made the first DIME files in 1967. More recently GDT, Inc. has been a major contractor on the Census Bureau's TIGER Line Files. GDT, Inc. is a major supplier of digital cartographic products. Chadwyck Healy's "SuperMap" uses GDT, Inc. products as does "MapInfo."

Susan Klimley is the Geological Sciences Librarian in the Geoscience Library, Lamont-Doherty Geological Observatory of Columbia University. Recent articles of interest include "Managing bibliographic references on a Macintosh," *Geoscience Information Society Proceedings* 20 (1989), pp. 123-131; "The Columbia CD-ROM Experience: Evaluation of map data on CD-ROM," *Western Association of Map Libraries Information Bulletin* (1988), pp. 19-22; and, "The Global Mouse or the World at Your Fingertips," *Lamont-Doherty Geological Observatory Yearbook* (1988), pp. 63-66.

Joel Morrison is Assistant Division Chief for Research of the U.S. Geological Survey. Morrison served as president of the International Cartographic Association (1984-1987), and was a member of the board of directors of the International Union for Surveying and Mapping. He is a member of the U.S. National Committee for the International Geographical Union, and was president (1981) of the American Congress of Surveying and Mapping.

Patrick McGlamery is the map librarian at the University of Connecticut. He is the author of a number of papers on electronic geographic information.

The last time information underwent such a fundamental transformation was when it moved from oral to written.

fundamental transformation was when it moved from oral to written. What is our relationship to this map-like material? Is it a map? Does the definition still work? What is a map? Is it that particular piece of paper, the *Spring Hill* 7.5' topographic quadrangle, or is it the time series of topos with reprints, photorevisions, and new editions and surficial and bedrock geology? When does that particular piece of paper transcend its finite information format and become a particle of the body of geographic information? When it does, and when we witness the user layering the graphic information either with tracing paper or in his or her mind, we are witnessing displays of the "virtual map." The paper map is a display of an aggregate of information compiled by the cartographer. The electronic map is an aggregate of information selected by the user. It is a synthesis of spatially referenced information displayed in a graphic format. A word processor, a common enough term now, processes words; a GIS processes geographic information.

...."users" assume that accuracy is inherent in our digital data and are demanding current data.

Most digital map data are currently a direct conversion of existing maps, but the digital form seems to invoke a closer scrutiny.

What is the library's relationship to this process? What are our responsibilities to the user, and to the information? How does this affect the distribution and dissemination of information in our society? Over the centuries librarians have strived to achieve a seamless "interface" with information. Acquisition of information, control and ultimately access to information are the basic needs that govern our profession. Though we are the only ones who can answer these basic questions, since we are a service profession, we can make ready use of our client group.

The paper map is a display of an aggregate of information compiled by the cartographer. The electronic map is an aggregate of information selected by the user.

Meridian asked a group of sophisticated users, including a librarian, who have been dealing with, creating, and determining policies and procedures for digital data for years. We posed four questions to this panel of experts. The questions were broad-based, designed to provide a springboard for discussion. The responses were thoughtful and evocative. They give us pause to think and, hopefully, assay our accomplishments. More, however, they give a foundation for examining our role in this unknown transformation of information.

Question: What are the most important concerns your clientele have with the production of digital spatial information as contrasted to more traditional forms?

Joel Morrison:

Currentness. The National Mapping Division (NMD) of the U.S. Geological Survey (USGS) has traditionally concerned itself with providing the people of the United States with the accurate spatial data in analog map format, a consistent coverage for the entire nation. Now that first-time, once-over, coverages at 1:24,000, 1:100,000, and 1:2,000,000 are complete (albeit much of it sadly out of date), NMD is attempting to convert these analog products to digital format. We find that our "users" assume that accuracy is inherent in our digital data and are demanding current data. Repeatedly, users ask for "up-to-date" data as their top priority. The request is made, however, assuming that the current data will adhere to our traditional accuracy standards.

Kate Beard:

While I am not primarily a producer of digital data, from my experience and observations I would say that data quality is one of the primary concerns. The client group I am most familiar with is state and local government. An interesting phenomenon is that attention to the quality of digital data seems to be greater than that directed toward traditional map products. I am not sure if this is something new and reflects greater demand for accountability for government actions and decisions in general, or whether it reflects a skepticism about digital

products. Most digital map data are currently a direct conversion of existing maps, but the digital form seems to invoke a closer scrutiny.

The other important concern associated with digital data is currency. People expect digital products to be more up-to-date.

Susan Klimley:

Because of the emphasis on ship- and satellite-collected data at Lamont, researchers have utilized digital spatial data for many years. The big advance in the past five years has been the creation of software that works with greatly increased storage media (optical disks); this has allowed researchers to select, compare and merge data from many large data sets—all accessed by longitude and latitude. A major concern is the ability to acquire additional high quality data sets. The technological "wish" list includes high-resolution scanners and color printers that can handle computer-generated images (overwhelmingly generated from spatial data). Spatial data use does not have to be promoted at Lamont.

It seems that *currentness* and *quality* are the most important concerns. The production of digital spatial information, as contrasted with more traditional forms, does not work well with dated editions.

Don Cooke:

My clientele are not as much interested in producing maps in the traditional sense as they are in solving problems or increasing the efficiency of operations that have a spatial aspect.

Many times problems like dispatching and routing can be solved by a computer accessing a digitized map, without ever displaying the map in image form. The computer can solve a spatial problem like truck routing by using an "invisible" map and generate the solution in the form of a sequenced list of stops that a truck must make.

GIS could play potentially as significant a role in society as the printing press.

People who want to solve such business problems want results. They do not want to learn about coordinates or shortest-path algorithms. They do not want to hire specialists or extensively retrain their employees. They certainly do not want to have to digitize paper maps! More and more they will depend on off-the-shelf digital map publications.

GIS has the potential to expand and popularize greatly the use and analysis of maps and geographic data.

Patrick McGlamery:

It seems that *currentness* and *quality* are the most important concerns. The production of digital spatial information, as contrasted with more traditional forms, does not work well with dated editions. Users of printed, or analog, maps, understanding the production process, expect dated material. Perhaps the instantaneous display of computer, or digital, maps heightens expectations.

This desire for currentness can be deceptive. Currentness has to be tempered with an awareness of the need for building historical collections in the library. Admittedly many users are primarily interested in the "here and now," but there is also a large group of users who need to look at a complete series of topographic maps, from the most current to the earliest. How often do engineers come to the Map Library looking for information that has been deleted from their working collections? Libraries and archives are repositories for information, current and historical, analog and digital.

Question: Describe what you foresee as the future of geographical information systems (GIS) in our society? What has GIS as a concept done to maps and spatial data use?

Kate Beard:

I think GIS could play potentially as significant a role in society as the printing press. The printing press in many ways democratized society by making books and printed material available to the masses rather than just to the wealthy and the intellectually elite. The serious use and analysis of maps has been limited to a few disciplines because these activities require expertise; they are further restricted in general because manual

map analysis is very tedious. GIS has the potential to expand and popularize greatly the use and analysis of maps and geographic data.

Joel Morrison:

GIS will promote a diversity of maps and map products. Technology today can produce custom-made maps. With access to a fully populated national spatial data infrastructure, both the use and the diversity of maps will increase.

With GIS, an individual has the capability to perform his or her own analysis which may corroborate or refute that developed by a government agency or a consultant.

Kate Beard:

As the technology becomes cheaper and more widely available (as I assume it will become), it will have the potential to empower individual citizens to policy making. With GIS, an individual has the capability to perform his or her own analysis which may corroborate or refute that developed by a government agency or a consultant. This, of course, assumes that digital data will be generally available to the public.

GIS will promote the establishment of the data infrastructure and encourage spatial literacy.

Don Cooke:

The technology of geographic information systems, in the broadest sense, is the technology of dealing with spatial knowledge using the power and untiring consistency of computers. So far, this knowledge has largely been applied to natural resources and land-use planning because the technology marketed was originally designed for this purpose and is best suited for digitizing and polygon overlay. This "traditional" GIS will continue to grow.

Joel Morrison:

GIS is a technology that revolutionizes cartography. The set of analytical tools and visualization options which a GIS offers a user requires current accurate spatial data of sufficient detail to make the analysis useful. The presence of GIS and the future capabilities to utilize GIS by humankind (some of whom are spatially illiterate) assume a spatial data infrastructure available to all potential users. Obviously, this does not now exist. GIS will promote the establishment of the data infrastructure and encourage spatial literacy.

New applications will grow from other capabilities, for example, those associated with address matching and modeling traffic flow over road networks.

Kate Beard:

I think GIS will play a role in popularizing geography. Until recently, geography has had the reputation of a rather fusty and uninteresting discipline. GIS brings geography into the electronic age and into competition with video games, such as Nintendo. It has a more serious role to play, however, as a tool for addressing social and environmental problems. Its key role here is as an integrating mechanism. It provides the tools to take a systems view of the environment.

Susan Klimley:

Geographical information systems have liberated data linked to a point on, below or above the earth's surface from imprecise political unit areas or name labels. It is always difficult to gather all the data about areas of geological interest which do not conform to political boundaries. It is even harder to identify data from areas of the ocean floor which frequently are not named. With longitude and latitude indexing systems and the capability of systems to identify and mark off needed areas, GIS makes the spatial identification of data much easier. In the future, I hope that bibliographic references in fields like geology and geography will also be accessible via these systems.

Don Cooke:

New applications will grow from other capabilities, for example, those associated with address matching and modeling traffic flow over road networks. These systems will depend on pre-existing digital map databases and will be designed for ease of use in specific operations rather than for general map conversion and manipulation. It is unlikely that the "tradi-

tional" GIS packages will compete effectively with specialized logistics-oriented applications systems.

As libraries have had a significant role in making printed material more accessible to the average citizen, so have they a potentially significant role in making digital data available to the general public.

Kate Beard:

As libraries have had a significant role in making printed material more accessible to the average citizen, so have they a potentially significant role in making digital data available to the general public.

Patrick McGlamery:

The future of geographical information systems is linked to the changing role of geographic information. "The set of analytical tools and visualization options which geographical information systems offer" will provide the user with the ability to participate actively in the display of geographic information. The popularization of geography and applications of mapping and geographic analysis will expand throughout the society.

The future of geographical information systems is linked to the changing role of geographic information.

Map libraries have witnessed the impact of "display" or printing technology. The "greening" of map libraries in America is a direct result of advances in offset lithography. The evolution from woodcut, through copper and steel engravings, to lithography has popularized maps in our society. Maps have evolved from planning documents for kings and merchant princes to guides for the common man.

GIS will allow the active participation of the common man. This display technology is defined as an almost instantaneous print of the very individualized needs of the user.

Question: Is there a future for "desktop mapping" and, if so, what is it?

...desktop mapping or dash-board mapping is an ideal commercial advertising medium.

Kate Beard:

Quite obviously Rupert Murdoch thinks that there is a future; he spent $25 million last year to acquire ETAK —the company which sells "onboard navigational systems" for cars and digital geographic databases for areas all over the world. Murdoch may be wrong but, judging by his past record, his venture into the field bears watching. From Murdoch's perspective, desktop mapping or dash-board mapping is an ideal commercial advertising medium. He is currently targeting the travel industry, giving travel agents and rental car agencies the ability to customize maps for their clients. As with radio, TV, and magazines, this is supported by advertising. Those businesses whose clientele are the traveling public stand to benefit by advertising in this medium.

Imagine a digital yellow pages in which every advertiser has been geocoded. Saturday morning shopping trips could then begin with a perusal of the home computer screen to find all hardware stores carrying the desired items within a 5- to 10-minute drive. The computer could also generate the optimal route from home to the selected merchants.

One could even imagine "desktop mapping" in large supermarkets or department stores to help shoppers locate desired items. The base for some of this already exists in the form of the Census TIGER files, which companies like ETAK and Geographic Data Technologies are enhancing for just such a market.

Don Cooke:

"Desktop Mapping" currently has an entry price of $1000 to $2000 when one considers the cost of mapping software and geographic databases. This price and the "technical" nature of the current desktop mapping offerings will limit the use of desktop mapping to specialists.

Price cuts on the order of 1/10 to 1/20 will create a much larger market—in homes, libraries and schools. The commercial success of "PC-USA" and "PC-Globe" (priced around $69) presages new markets and wider use of desktop mapping.

Consumer acceptence of CD-

ROM—if it ever happens—will bolster growth of "consumer" desktop mapping by increasing the amount of data that can be delivered to customers at low cost.

The future of useful desktop mapping depends on the availability of useful data.

Susan Klimley:

Mapping is already becoming a much less laborious process in this age of "desktop mapping." Previously, maps were produced primarily as an end product of data collection and were created by skilled cartographers and graphics artists. Desktop mapping allows researchers to integrate numerical data with satellite images and traditional base maps in the early stages in their research, thereby using mapping as a tool for analysis and evaluation in the early stages of research.

This is still a young market. We should expect it to change a lot in the next five years.

Joel Morrison:

Desktop mapping has a supporting role in almost any endeavor provided that the user is spatially literate. Engineering, design, construction, marketing, sales, distribution, advertising, government services (from clinics through food stamps, to the development of smart weapons) can all utilize desktop mapping. The most costly missing link is adequate data. The future of useful desktop mapping depends on the availability of useful data.

Patrick McGlamery:

"Desktop mapping" is a new product market. An established base of hardware, including CD-ROM readers, needs to exist. "Price cuts on the order of 1/10 to 1/20 will create a much larger market—in homes, libraries and schools."

This is still a young market. We should expect it to change a lot in the next five years. For example, public domain TIGER line files in libraries should have a real impact on desktop mapping. Heretofore, digital mapping has really only been in the hands of digital mapping vendors. Often the digital information they sell starts as public domain data. Libraries may cut out the middleman for the popular user.

Libraries are secondary distributors of information. They buy material from publishers, organize it for efficient access and make it available to the public at low cost.

Question: What do you see as the library's role in the efficient distribution of information, especially as it relates to spatially referenced information?

Susan Klimley:

The library's role in distribution of spatially referenced information is very similar to its role with other kinds of data. The library acquires data for the *whole* organization, for present needs and potential needs. It may be very efficient for one research group to acquire a particular research data set for itself. Unfortunately the data, or the equipment to use it, may not be available to potential users outside the immediate group—especially undergraduate or graduate students.

Just as with books and journals, the library is set up to let the community know what is available, where it is, to circulate it and to make sure valuable resources are not lost.

The library staff may not be able to interpret the nuances of each data set, but they probably will be able to get patrons started and help with functions like printing and transferring files. Libraries are already coping with funding for file and equipment purchases; at Lamont, decisions about file acquisition vs. journal purchases are already under discussion.

Kate Beard:

Libraries are secondary distributors of information. They buy material from publishers, organize it for efficient access and make it available to the public at low cost. I think this same role will apply to digital data. There is and will be both government and commercial production and distribution of digital map products. Consumers can purchase directly from the source or have the option of accessing them or checking them out

The library's role relative to the potential user is at least (1) to identify what data are available, (2) to provide information on how to access the data, and (3) to provide information on the minimum hardware configuration necessary to utilize the data.

from the library. I would imagine the same motivations that influence users to purchase or to borrow books apply to their decisions to purchase digital data or to borrow it from the library (including the cost, the frequency of use, etc.).

Of course a few barriers currently exist to widespread distribution of digital spatial data. Unlike traditional printed material, digital products require some combination of hardware and software, neither of which have a universal standard. Libraries could face the difficulties and costs of managing multiple formats (ASCII, EBSIDIC, binary, DLG, TIGER, DXF, etc., etc.) and multiple distribution media (3.5- and 5.25-inch diskettes, Bernoulli, 9 track tapes, CD-ROMs, erasable optical disks, etc.). Users could be asked to supply their own media—bring their own floppy disks, tapes, etc. appropriate to their applications and hardware. This would still require libraries to furnish the hardware for these different distribution formats. "Checked out" data could possibly be time stamped—12, 24, 48 hours with a sliding scale fee. It would not be returnable but could be renewable.

Unlike traditional printed material, digital products require some combination of hardware and software, neither of which have a universal standard.

Don Cooke:

There are a lot of "chickens-and-egg" issues surrounding libraries and the offering of digital maps. One has to do with the fact that a library would need quite a sizable digital map database on hand to make the digital map resource competitive in utility with the current stock of paper maps and atlases. A publishing medium like CD-ROM must be available to facilitate efficient transfer of large spatial databases.

A more immediate concern for information management is with past and current GIS data sets.

Digital map publishers will not put lots of useful digital map databases on the market if there are not lots of CD-ROM readers and public-access computers. This decision will most likely be driven by the availablity on CD-ROM of non-spatial databases.

There are a lot of "chickens-and-egg" issues surrounding libraries and the offering of digital maps.

Once the library owns the hardware infrastructure for handling CD-ROM, a decision to buy an available "CD-MAP" will be simple.

Kate Beard:

One consideration is that the update (edition) cycle will be much faster. If producers are making continual updates to their databases, the library should most optimally be distributing the most current versions. This would suggest electronic subscriptions with digital data producers, e.g., USGS and Rand McNally.

This scenario addresses future routine data distribution. A more immediate concern for information management is with past and current GIS data sets. Several GIS projects have already been produced and are sitting on 9-track tapes in closets, or worse. Some of these may be worth salvaging for historical value. There is a potentially valuable role for libraries in soliciting and collecting such data sets, transferring them to a more stable medium, and then archiving them. Standards may again be a problem as some software and hardware used to create such data sets may no longer exist and often documentation is minimal or non-existent.

Joel Morrison:

The library's role relative to the potential user is at least (1) to identify what data are available, (2) to provide information on how to access the data, and (3) to provide information on the minimum hardware configuration necessary to utilize the data. The library can not "hold" all of the spatially referenced information. One unresolved question concerns "historical spatially referenced information." Who will be responsible for data describing 1990, when the current data describe 1995?

Patrick McGlamery:

The library's role in the efficient distribution of digital information does not change much from its role in the paper world. Again, it is to

acquire, control and access. But there are many unanswered questions. These include the problems surrounding the retention of historical spatially referenced information, the adoption of CD-ROM technology, the overwhelming variety of storage media and data formats, as well as the documentation of these data bases, and "where's the title?"

These, and the other three questions, focus on issues which librarians must discuss and resolve. Librarians can effect the format of information through initiatives such as the Cartographic Users Advisory Council (CUAC). These questions reflect the nature of some of the problems which are associated with and generated by digital information, and digital information is here to stay.

Did You Miss ... National Reading a Road Map Day?

The first annual National Reading a Road Map Day was held on April 4, 1991.

Designed "to bring attention to the importance and enjoyment of knowing how to read a road map," the first annual National Reading a Road Map Day was held on April 4, 1991. Announced in *Are We There Yet?*, the newsletter of the Road Map Lovers Society (as well as elsewhere in the media), this commemoration was the creation of Rosalind Schilder, president of the Road Map Lovers Society. Ms. Schilder promotes road map literacy, spreading the joy of reading road maps to people of all ages, but most particularly to children.

The newsletter includes a basic, four-step method to introduce "map illiterates" to map reading, a column for teachers from kindergarten through eighth grade containing ideas for map use in the classroom, a parent's page, and an article with party suggestions for celebrating National Reading a Road Map Day, complete with instructions for invitations, decorations and games. The newsletter also lists other sources of teaching aids for road map literacy.

In 1980, Rosalind Schilder completed a booklet designed to take the mystery out of road map reading; revised in 1982, *Everything You've Always Wanted To Know About Reading a Road Map... But Were Afraid To Ask* is written in a straight-forward, reassuring manner. The first of five "lessons" emphasizes two points: Road map reading is a learned skill and both sexes can master this skill. The second lesson emphasizes effective use of the map legend. Lesson III contains an "open map" quiz, Lesson IV guides the student along a "trip", and in Lesson V the student plots several routes between two destinations. At first reading, the terminology used in the booklet seems to indicate that it is intended for adults. The Teacher's Guide at the end, however, clearly indicates that the booklet was developed with the young learner in mind; the original edition was tested for use by children of all ages and intellectual capabilities. *Everything You've Always Wanted To Know, But Were Afraid To Ask* should be useful for both children and adults first learning the basics of road maps.

"Happiness is Knowing How to Read a Road Map"

For copies of *Are We There Yet?*, the newsletter of the Road Map Lovers Society, write to Ms. Schilder at P. O. Box 708, Plymouth Meeting, PA 19452. For a copy of *Everything You've Always Wanted To Know About Reading a Road Map... But Were Afraid To Ask*, send $5.00 and a self-addressed, stamped envelope (use 3 first class stamps). For your $5.00, you will also receive a Teaching Supplement and a bumper sticker with the Road Map Lovers Society Motto: "Happiness is Knowing How to Read a Road Map".

Mary C. Prante

Images of Exploration

J. B. Post
Free Library of Philadelphia

Mere words often cannot describe events, artifacts, or places which are completely foreign to the reader.

Exploration invariably results in reports by the explorer to recount for those who remained behind the wonders which had been discovered along the way. Mere words often cannot describe events, artifacts, or places which are completely foreign to the reader. So, many reports are accompanied by illustrations, either as independent pieces or as decorative items on cartographic by-products.

The best way to begin a discussion of exploration images is with some definitions. When terms such as "exploration" are used, they are customarily in the context of the European civilization which settled in various parts of the world. One could include the Polynesian stick charts as an image of exploration, but most of the time the explorations of representatives of European civilization are intended.

"Exploration" could be considered the more or less systematic examination of something—in the geographic context, a countryside—and the describing of that something.

A distinction must be made among "discovery," "exploration," "travel," and "settlement." Obviously, they can be related and one leads to another. "Discovery" can be thought of as the sometimes serendipitous stumbling upon something. "Exploration" could be considered the more or less systematic examination of something—in the geographic context, a countryside—and the describing of that something. Exploration and discovery can happen at the same time, but a landscape can be explored many times as instrumentation improves and purposes change. While "travel" to a place can be both discovery and exploration on a personal level, on a societal level it is not considered to produce new information; rather it uses what others have already gathered. "Settlement" is traveling to a place and occupying it. All four of these activities have their literatures and their graphics.

Graphics can be broken down into three sub-categories, the first being symbolic ... these are graphics presenting their message in symbols.

"Images" can mean many things. When I was a map librarian, I first used the term "pictographics" when discussing those non-mappish illustrations connected with essentially cartographic objects. They were things like the borders and cartouches on maps, the views of coastlines on nautical charts, and the illustrations in nineteenth century county atlases. I abandoned that term and started to use "non-carto graphics" instead in a very narrow sense of non-mappish illustrations in mappish contexts. It became apparent that the context had to be broadened and, for a while, the new term worked but these terms and their usage still need modification. There will always be hybrids and odd things, but they should be ignored for the purposes of this discussion.

Graphics can be broken down into three sub-categories, the first being symbolic. Maps fit neatly into this group. No one—not even those of us who do not use a map to orient ourselves in the world but the world to orient ourselves on the map—considers the map to be reality. No one believes that if you went up in a balloon, you would see what is on a road map. Stylized symbols are used to depict a landscape. The symbols may change over time, but not the symbolizing process. Simply put, these are graphics presenting their message in symbols.

Next ... are the artists' renderings of terrain.

Next, after symbolic renderings, are the artists' renderings of terrain. Some, but not all, panoramic views can go in this class. If there are no other marks on the image other than those representing what one would

see if one were up in the air, it is an artistic rendering; but if there are symbols next to representations of structures with an explanation in the margin or if the name of streets are written on the streets (unless the name actually is painted in the middle of a street), it is more of a hybrid and assumes map functions. Never use the inaccurate term "bird's-eye view" for a panoramic view even though most people know the term; remember that not all panoramic views are exactly what one thinks of as "bird's-eye views."

The third category was originally two categories until an archivist pointed out that they could be viewed as one, hesitantly called "photonic renderings."

The third category was originally two categories until an archivist pointed out that they could be viewed as one, hesitantly called "photonic renderings." Photographs spring to mind. Telemetric data sent by satellites and planetary probes was the original fourth category until it was suggested that most, but not all, of this remotely sensed data is gathered using portions of the electromagnetic spectrum. Visible light is part of that spectrum as well. The images of the Earth from space or of the Martian surface, once the data are interpreted and enhanced, look much like photographs in their visual impression.

These categories are rather simplistic and immediately problems arise. Where would one place an Andrea Kron production or a Harvey Hutter production? Are not artists' renderings just as symbolic and tied to a culture as cartographic symbols? When the satellite imagery of cloud cover is broadcast on the evening news and state boundaries added, is that image then a map? These and other problems are not being denied, but they are not germane to the issue at hand. All that is wanted is the establishment of three categories of graphic images, however tentatively, as a frame where one can discuss maps, drawn landscape views, and photographs on equal terms without an implied superiority of one above the others. One can have preferences; but in the matter of conveying information, all are essential.

There are two dimensions of graphic images being excluded. The medium or method of production does influence the finished product. The techniques of woodcuts, engravings and lithographs are different, and the maps and landscape views produced by these different means use those techniques to convey information differently. Often, the public may not be aware of the differences. Still, "a map is a map" and a photograph, whether the light sensitive emulsion is on glass or film, is still a photograph, although the problems of glass plate negatives in the field or the type of film used are real and impact on the end product. These matters are acknowledged in passing, saving a detailed examination of them for another occasion.

The dimension to be completely passed over is the aesthetic. Graphic images are pretty things which look wonderful on walls, but it is not their prettiness which compels this essay.

Images of exploration have been produced since the earliest days of venturing into the unknown; their production continues today. There are large numbers of examples of this visual method of communication.

Images of exploration have been produced since the earliest days of venturing into the unknown; their production continues through today.

The Herman Moll *New and Exact Map of the Dominions of the King of Great Britain on ye Continent of North America* (London, 1715) includes the famous—or infamous—illustration showing the beavers working a dam site more like humans. The question

... does an image of exploration have to be accurate?

raised here is one of accuracy: does an image of exploration have to be accurate? The crux of this matter is one of intent. The tall travel tale and outright fraud are a genre or genres unto themselves and have a developed a body of critical literature. As long as we are aware that maps and illustrations have been done for such fabrications, we can leave it at that. Error is not fraud, however. Remember that many illustrations are done not by the explorers themselves but by artists and illustrators working from sketches and field notes. Error is

Error is understandable and even tolerable within limits when taken in the context of its time.

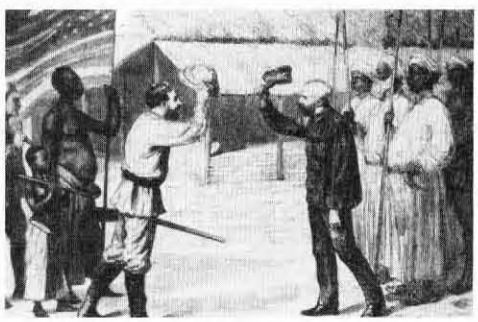
understandable and even tolerable within limits when taken in the context of its time. For how long was California viewed as an island?

Nor need the image of exploration be contemporary with the event

... anticipation has to be put in the realm of fantasy.

A distinction must be made between hare-brained fantasy and technical projection.

depicted. A perfect example are the idealized renderings of Columbus landing in the New World and claiming it for Spain; there are several versions of the landing. Just as there are historical atlases illustrating shifting boundaries and peoples, so, too, can there be non-carto graphics depicting earlier events than the time they were created. Illustrations anticipating exploration can be produced, but that borders on science fiction, and however dearly I love it and however much I enjoyed *The Conquest of Space* with the Bonestell illustrations, anticipation has to be put in the realm of fantasy. Even that heavenly NASA material on what they are going to do is fantasy until it is done. A distinction must be made between hare-brained fantasy and technical projection.

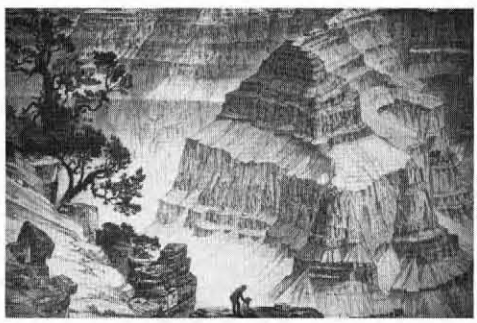


Even with graphics contemporary or nearly so with an event, there can be differences. There are several versions of the famous meeting between Stanley and Livingston. Some are more dramatic and heroic than others, but all catch the spirit in a popular way.

In the broad picture, one can't ignore the illustrations of Thomas

Moran and William Henry Holmes. Thomas Moran was one of the great painters of western America; it could be debated whether the Moran paintings or the William Henry Jackson photographs were more important in establishing national parks.

Both Moran and Holmes provided material for the *Atlas to Accompany ... Grand Canyon*. Holmes contributed more illustrations and, as William



In some ways ... illustrations are superior to photographs.

Goetzmann points out, Holmes was more the geologist. In some ways, the Holmes illustrations are superior to photographs. Holmes is also deserving of a full biography; having abandoned his art for ethnology, his influence is still felt in museum organization.

Having mentioned William Henry Jackson, we should discuss some of his work, for example, his photograph of Thomas Moran sketching. His photograph of an artist sketching

... in the nineteenth century there was not the distinction between fine art and scientific illustration ...

on an exploring expedition is almost perfect to stand for images of exploration. Jackson is remembered as one of the great photographers of the West.

The Geological Survey has a treasure trove of illustrations from expeditions. Not only was the country documented, but the expeditions themselves were well photographed.

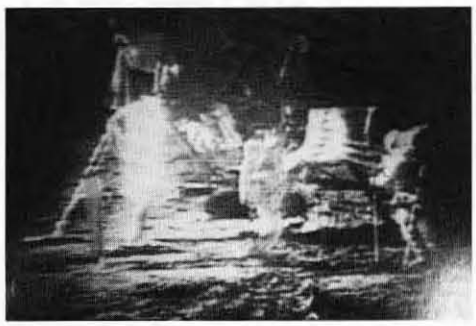
The Wilkes Expedition, a naval survey and exploring expedition in the years 1838-1842, assured a place for the United States as an exploring nation. The expedition and its illustrators are well documented in *Magnificent Voyagers*. It is worth

noting that one of the illustrators on the expedition was Titian Ramsey Peale of Philadelphia, later to become one of the nation's leading still life painters. The Peale family had a scientific as well as an artistic bent, for in the nineteenth century there was not the distinction between fine art and scientific illustration that we have erected since then.

Each nation has its explorers of note. The eighteenth century was a time when nations competed for discoveries to claim in a game of one-upmanship. Bernard Smith states in the preface to *Art of Captain Cook's Voyages*:

Yet it was realized by Cook himself and his scientific companions that it would not be possible to communicate to the European public many of their discoveries unless their verbal reports were accompanied by accurate drawings. Cook was the first of a new breed of explorers who made full use of visual as well as verbal means for conveying the results of his observations.

As with the Wilkes expedition, Cook started a trend which was not to be reversed.



... telemetric data are certainly a part of images of exploration.

Jumping ahead in time, man has landed on the Moon. Admittedly, one of the great urges is to go someplace because it is there. The exploration—a kinder and gentler term than "conquest"—of space is one of the most exciting things which has happened in our lifetime and the telemetric data are certainly a part of images of exploration.

... satellites and probes are part of us and our urge to explore.

Remembering the notation that some images were created by people who had not been to the new lands, consider views of the Martian terrain —if that term may be used. The remotely sensed images of the Martian surface have served scientists

and armchair travelers in different ways. For the artist, such images serve as source material for other images. Ludek Pesek developed this image for *The Red Planet Mars* map supplement which appeared in

National Geographic in February 1973. There are a continuing series of legitimate exploring images from places where no man has gone, such

as those of the Uranian satellite Ariel sent back by servo-mechanism. Our satellites and probes are part of us and our urge to explore.

William H. Goetzmann's *New Lands, New Men* ... is a great resource for ideas about all aspects of exploration.

But our own orb is far from completely explored. The most obvious place is under the sea, but the land is also far from completely mapped.

This has been the briefest of overviews of images of exploration. Many texts have been written about images and their place in exploration history, most usually accompanied by reproductions of images for easy browsing and use.

William H. Goetzmann's *New Lands, New Men* (New York: Viking, 1986) is the best overview of United States exploring. Goetzmann deals with the philosophical issues as well as documenting the explorations. This volume is a great resource for ideas about all aspects of exploration.

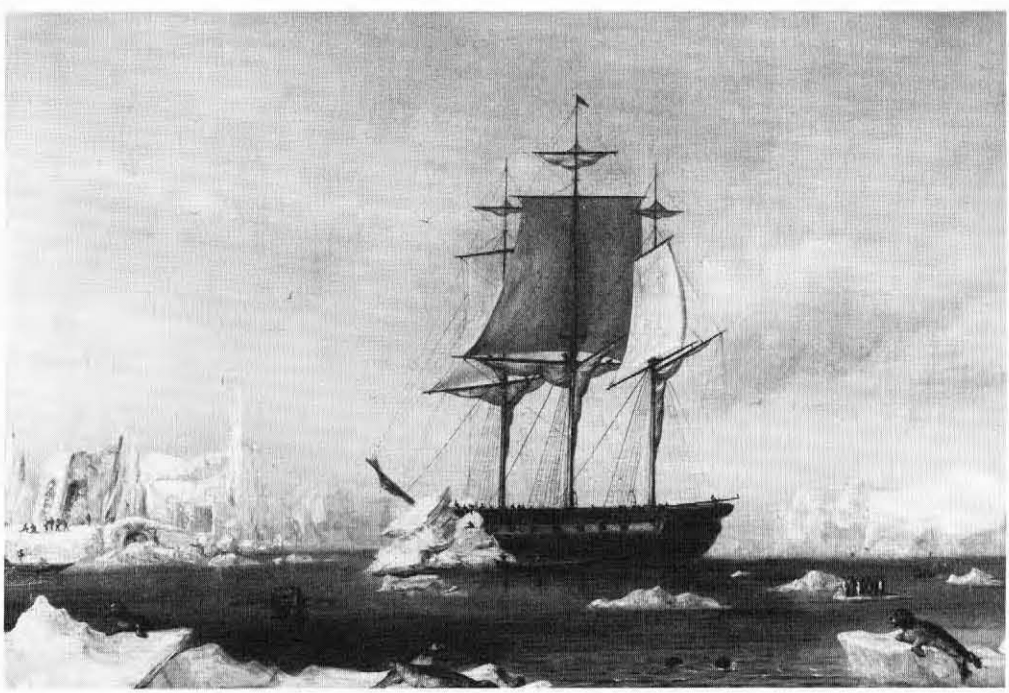
Magnificent Voyagers (Washington: Smithsonian Institution Press, 1985), a study of the Wilkes expedition by many hands, is almost prototypical of how an exploring expedition should be documented and certainly sets some standards. Goetzmann uses the same illustration, an oil painting attributed to Wilkes himself, for the cover of his book as was used for this work. This image is—maybe—the best symbol prior to the Moon landing for United States exploring.

Rudiger Joppien's *Art of Captain Cook's Voyages* (New Haven: Yale University Press, 1985) is a multi-volume work concerned with the graphics of a series expeditions and is instructive to browse.

Era of Exploration: The Rise of Landscape Photography in the American West, 1860-1885 (Boston: New York Graphic Society, 1975) is a good compilation of photographic images of the West, not all dealing with what we would consider strictly exploration, but all interesting.

While not dealing directly with what we would consider exploration, Ranier Fabian and Hans-Christian Adam have given us *Masters of Early Travel Photography* (New York:

... an oil painting attributed to Wilkes himself ... is—maybe—the best symbol prior to the Moon landing for United States exploring.



Painting of the *USS Vincennes* in Disappointment Bay, Antarctica, January 1840. Attributed to Charles Wilkes. 59.7 x 90.2 cm. Courtesy Peabody Museum of Salem.

Non-carto graphics intrude into the world of map librarians.... They can be useful—and looked at as sort of maps.

Vendome Press, 1983), again an interesting volume of illustrations. In *Era of Exploration*, the previously cited work, there are photographs of the survey teams at the Grand Canyon; in this volume there is a photograph of bustled ladies overlooking the rim. Travel for trade or pleasure always seems to follow exploration.

I could continue and cite other works, notably books of illustrations from *National Geographic*, but we all know about such things. Photography of archaeological digs has its own custodians and is well documented. John Reps has not been forgotten, but his productions could be considered images of settlement—and in future essays, he can be given his due.

Non-carto graphics intrude into the world of map librarians. Collections may include panoramic views, aerial photography, nineteenth century illustrated county atlases, and satellite imagery. They can be useful—and looked at as sort of maps. Users must be aware where other graphic "stuff" is located. But as geography librarians, these other graphics are more closely related to those charged with providing geographic, as opposed to strictly cartographic, information. Perhaps the care and preservation of the original graphic materials, be they oil paintings, glass negatives, photographic prints or lithographs, can be left to other specialists, but the reproductions of such images in printed volumes are germane to geographic studies and belong in geographic collections.

This article was prepared for publication with the assistance of Jenny Marie Johnson. It was originally presented at the 1990 annual meetings of the American Library Association.

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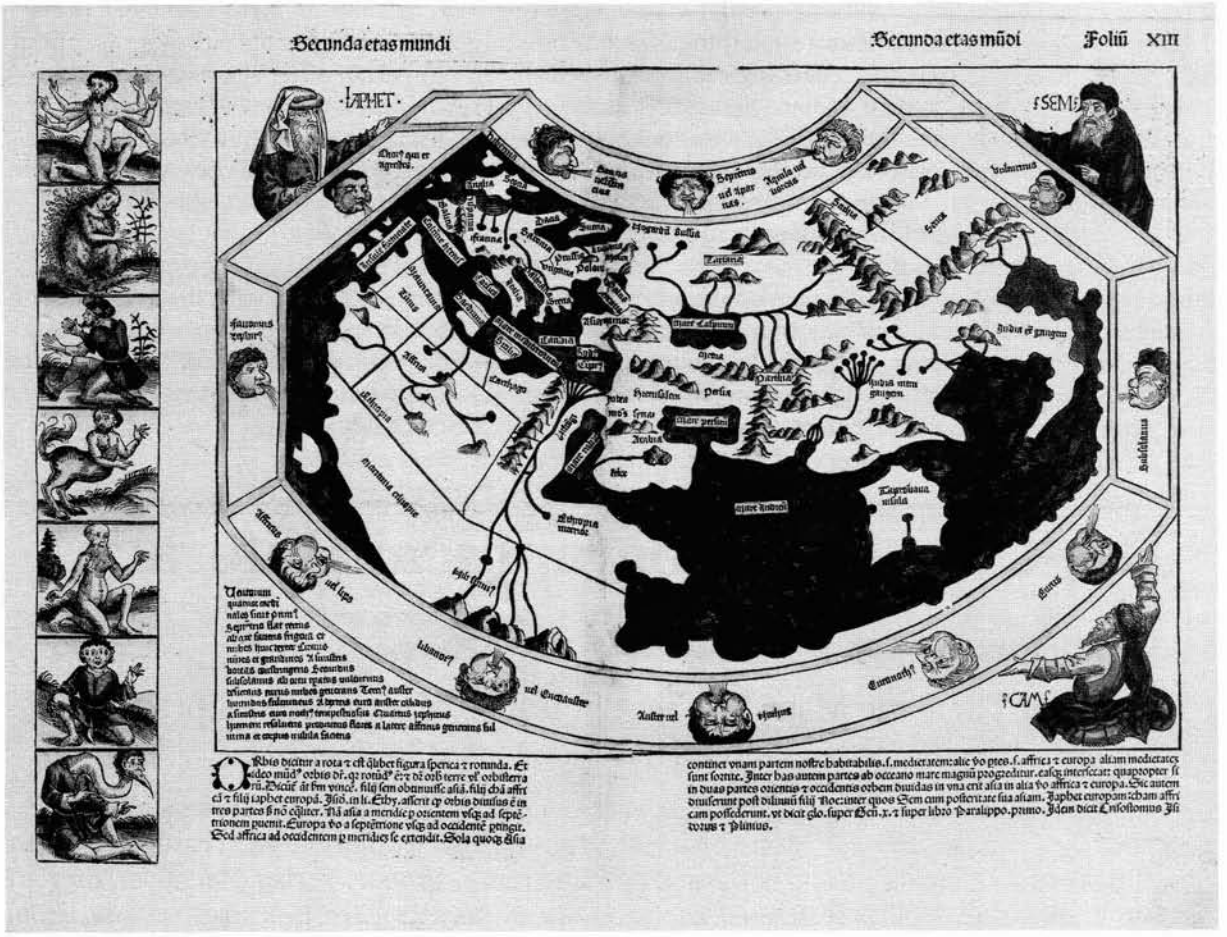

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In only fifteen years, through a combination of aggressive acquisition and timely donations, the Cartographic History Library has developed one of the leading antique map collections in the South and Southwest. Focusing on the cartographic history of Texas, the Gulf of Mexico and the Southwest, as well as on cartographic history in general and the United States atlas trade, the CHL has used its growing collection of regionally focused and unique resources to promote intramural and outreach programs for both scholars and the general public.

Since its founding, the CHL has developed into one of the leading antique map collections in the South and Southwest.

The Cartographic History Library (CHL), a component of the Special Collections Division of The University of Texas at Arlington Libraries, was created in 1976 when UT-Arlington, through the support of The University of Texas System Board of Regents, Mr. and Mrs. Jenkins Garrett, and the Sid Richardson and Brown and Lupton Foundations of Fort Worth, Texas, acquired the maps and cartographic resources of the Edward Eberstadt and Sons Bookstore from Austin book dealer John H. Jenkins. The year before, Jenkins had purchased the inventory of these venerable New York bookmen and moved it to Texas. The Eberstadt maps, in addition to maps purchased during a trip to leading map dealers in New York, Paris, London and Amsterdam, became the nucleus of the CHL's holdings. In 1978, two years after the CHL's founding, the University built beautiful physical quarters on the sixth floor of its Central Library in which to hold this important collection of maps and related resources.

... its most important collecting objective has been to document the exploration, settlement, development and mapping of Texas, the Southwest and the Gulf of Mexico region.

Since its founding, the CHL has developed into one of the leading antique map collections in the South and Southwest. Through aggressive acquisitions and timely donations, the collection now includes 5,000 printed and manuscript maps; 400 immigrant and pocket maps; 1,400 mostly American-produced school and commercial atlases, geographies, and gazetteers; and several thousand monographs, serials, periodicals, and government publications about maps and cartographic history.

The CHL's collecting policy has evolved over time, defining the scope and focus of the collection and setting parameters. The policy can be divided into three basic areas: the cartographic history of Texas, the Gulf of Mexico and the Southwest; cartographic history in general, dating from the discovery of the New World to the turn of the 20th century; and the development of the United States atlas trade from the American Revolution to the current period.

Since the library's founding, its most important collecting objective has been to document the exploration, settlement, development and mapping of Texas, the Southwest (defined here as Texas, New Mexico, Arizona, Southern California, and Northern Mexico) and the Gulf of Mexico region. Indeed, the collection was begun to complement and add further dimension to the archival, manuscript, and printed sources on Texas and the Southwest found in the Special Collections Division. History and geography have always been allied disciplines, a fact perceived by John Smith as early as 1624 when he wrote in his *Generall History of*

This map was constructed by two brothers, John and Charles Walker, who were active in London in the first half of the 19th century. The map was published by the firm of Chapman and Hall under the superintendence of the Society for Diffusion of Useful Knowledge (SDUK). As stated in its prospectus of 1829, the Society's aim was to "produce maps of unexampled cheapness, yet finished in the best manner ... an intermediate size between the large and expensive maps fit only for the library and that smaller size usually adopted in schools." The Society met its goal, eventually publishing 196 separate maps by 1844. These maps were also published in atlas form in 1844 with 14 sheets devoted to the U.S.

The Walker map, a detail of which is shown here, depicts the land which we know today as the American Southwest and northern Mexico. Published in 1842, the map includes more than 250 place names, 180 rivers and lakes, 25 mountains, 40 coastal features, 15 Indian tribes, and 35 other notes on trails and terrain.

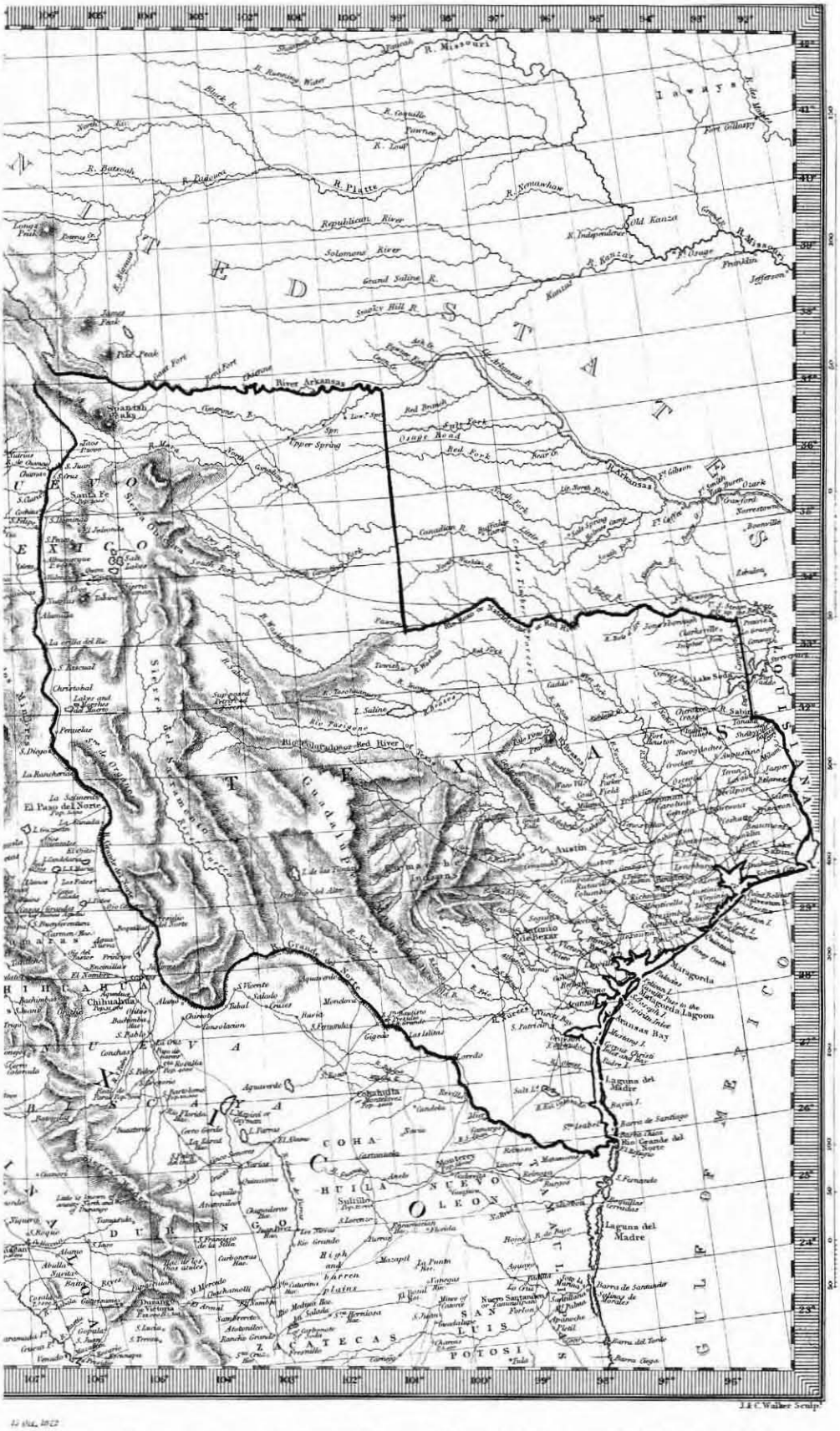

Figure 1. *Central America, II. Including Texas, California and the Northern States of Mexico.* Society for Diffusion of Useful Knowledge. London: Chapman & Hall. 1842.

Virginia: "As Geography without History seems as carcass without motion, so History without Geography wanders as a vagrant without certain habitation."

To understand the history of the Southwest, or any region, one must understand its geography. Equally important is a firm understanding of how geographic information about the region evolved and progressed. Historical researchers must be able to see the region as it was perceived in the past. There is no better source for doing this than maps. Like letters, journals, newspapers, and other documentary sources, maps are fundamental documents for the study of the past and, like these other sources, maps can be fully interpreted only when they are placed in their historical contexts.

... most of the landmark maps of the region are represented in the collection.

Because of the charge to enhance and complement the other sources in the division, the overwhelming majority of the sheet maps in the CHL show Texas and/or the Southwest. The bulk of the maps date from the early 1500s to 1900. CHL staff, however, have recently devoted increased resources to developing the holdings for the twentieth century. Space limitations make it impossible to discuss individual maps, but most landmark maps of the region are represented in the collection. Since maps focusing only on Texas or the Southwest were not produced until the nineteenth century, the collection includes maps of varying scope and format and includes maps with a broader view than just the state or region. Both printed and manuscript materials are collected.

A good discussion of some of the specific maps in the CHL can be found in Robert Sidney Martin's 1983 article, "Treasures of the Cartographic History Library at The University of Texas at Arlington" (*The Map Collector*, December 1983, pp. 14-19). Since this publication, the library's holdings have grown significantly. In fact, donations from Mr. and Mrs. Lewis Buttery of Lampasas, Texas and Mr. and Mrs. Ted Mayborn of Granbury, Texas have added 1,450 maps to the CHL collection. The library also has on deposit the Virginia Garrett Map Collection;

First published in 1718, this landmark map by Delisle accurately depicts the Mississippi River and its tributaries. It also graphically represents the French claim to the land between the Rio Grande and the Appalachian Mountains.

Figure 2. Guillaume Delisle, *Carte de la Louisiane et du Cours du Mississippi*. 1745.

consisting of 650 maps of the region, it is considered by many to be the finest collection of its type in private hands. These and other donations, as well as annual purchases, have enabled the CHL to develop into one of the preeminent collections focusing on the Southwest.

The second collecting area pertains to the history of cartography. The library collects representative works of leading map makers and publishers, attempting to show through its collection the significant cartographic and printing trends which have had an impact on the field since the late 15th century. CHL staff, of course, endeavor to acquire maps which show the Southwest and reflect the work of important cartographers. This is not always possible, however. When maps are offered to the library which do not depict the region, they are evaluated based on their importance, or their cartographer's importance, to cartographic history overall. Because of the prices of antique maps, funds are spent only in purchasing maps which reflect the library's geographical focus. Donated maps, however, are appraised using either criterion.

The library collects representative works of the leading map makers and publishers of the Western world ...

Two factors have prompted the CHL to collect representative works. First, maps, as R. A. Skelton has pointed out, have both artifactual as well as informational value. As an artifact, a map reflects how and when it was created. Its paper, ink, geographic orientation, printing method, and other physical characteristics reveal a map's biography as an object produced in a specific historical period and by a specific cartographer. The information shown on the map and the way in which it is presented also help to place the map in a historical context. Today, maps are studied both as artifacts and as information sources, and the CHL is building a representative collection to support research in both areas.

... maps ... have both artifactual as well as informational value.... the CHL is building a representative collection to support research in both areas.

The second reason the library is building such a collection is that its holdings support a growing number of geography and historical cartography courses being offered at UT-Arlington. For the past decade, Dr. Dennis Reinhartz, an associate professor in the University's History Department, has offered undergraduate and graduate courses on the history of cartography. Dr. Reinhartz not only teaches the courses in the CHL and uses the maps as classroom resources, but he also assigns research topics on the historical development of cartography. In addition, the University and the History Department, in order to foster research and sponsor public programming in these areas and to more fully utilize the library's holdings, have recently created a Center for Greater Southwestern Studies and the History of Cartography. Moreover, the University has added a geography minor within the past year,

Figure 3. "Stages of Society." In S. Augustus Mitchell, *Mitchell's School Geography. A System of Modern Geography, Comprising a Description of the Present State of the World ...* Third Revised Edition. Philadelphia: Thomas, Cowperthwait & Co. 1850. Page 2.

incorporating even more and varied courses which will use the CHL's collection. In short, the CHL not only supports courses in Texas and Southwest history, but it is being called upon to provide the resources necessary to support an expanding curriculum in geography. The scope and focus of the library has been broadened as a result.

... school atlases and geographies are an open and uncrowded collecting field.

The most recent CHL collecting objective is to build a collection of American-produced school and commercial atlases, geographies, and gazetteers. This emphasis resulted from acquiring some 1,200 titles in late 1990 and early 1991 . Approximately 476 of these titles were school atlases and geographies acquired from Murray Hudson, a map dealer and collector in Halls, Tennessee. For the past fifteen years, Hudson had been collecting similar textbooks. He believed, and still believes, that institutions and collectors have essentially ignored school atlases and, as a result, the volumes were undervalued. The atlases and geographies he acquired were all used in U.S. classrooms, primarily in the nineteenth century (though some predate and post-date the 1800s), a century marked by the rapid growth of public education. The collection includes multiple editions from the leading atlas producers of the period including, but not limited to, Jedidiah Morse, William Guthrie, Jacob Cummings, William Woodbridge, Sidney Morse, Jacob Willett, J. Olney, Samuel Augustus Mitchell, Roswell Smith, George Fitch, Samuel Goodrich, and Sarah Sophia Cornell.

The school atlases and geographies also incorporate in their pages the progression of geographic knowledge.... The school texts ... provide ... an opportunity to examine broad pedagogical issues...

Like Hudson, CHL staff believe that school atlases and geographies are an open and uncrowded collecting field. These textbooks provide virtually untapped research opportunities even though they are relatively scarce and are often found in less than good condition because of the rough treatment they received from students. Little has been written about them, save for Louis Karpinski's inclusion of them in his *Maps of Famous Cartographers Depicting North America: An Historical Atlas of the Great Lakes and Michigan, with Bibliography of the Printed Maps of Michigan to 1880*, first published in 1931. These atlases, as Karpinski states, deserve careful study because they were given wide circulation at their time of publication and were probably the one source most families used in locating places and learning about geography.

The school atlases and geographies also incorporate in their pages the progression of geographic knowledge about the U.S. and other countries more quickly than do commercial atlases because they were frequently revised and updated, sometimes as often as twice a year. The school texts, moreover, provide researchers an opportunity to examine broad pedagogical issues such as the methods and concepts used in the past to teach geography, how these methods changed over time, and the cultural, ethnic and gender attitudes reflected in the texts themselves. These factors, coupled with the fact that the school atlases comprise an important segment of the work of the leading U.S. map producers, make them sources worthy of serious study.

The school atlases are complemented in the CHL by approximately 720 United States-produced commercial atlases, acquired at the same time as many of the school atlases in 1990 and 1991. Mrs. Virginia Garrett donated half of these volumes to the library while the remaining half were acquired from Hudson. The commercial atlases date from 1801 to 1990 and include several editions from many of the major U.S. publishers of the time, such as George Colton, Alvin Johnson, Samuel Augustus Mitchell, Asher and Adams, George F. Cram, Rand McNally, People's Publishing Company, Collier and Son, John Bartholomew, Hammond and Company, and Doubleday and Company. Like the school atlases, U.S. commercial atlases have been

relatively ignored by the library and collecting community, except for the rarities of the late 18th and early 19th centuries. Information about them is scattered and incomplete, a fact noted by Philip Lee Phillips in his groundbreaking bibliography, *A List of Geographical Atlases in the Library of Congress with Bibliographical Notes*, the first two volumes of which were published in 1909.

The library also sponsors outreach programs aimed at informing and educating both scholars and the general public of the importance of maps in the research process.

Atlases are one of the more convenient cartographic formats. In the United States, their publication literally exploded in the first few decades of the nineteenth century as the need for up-to-date geographic information in an expanding nation created demand for them. Commercial publishers stepped in to meet this demand. The atlases recorded and interpreted the rapidly changing information regarding political boundaries, the growth of transportation networks, flora, fauna, migration patterns, town building, and many other subjects. In the twentieth century, the atlases became even more thematic, reflecting advances in the fields of geology, ethnology, meteorology, and oceanography. The turmoil and political dislocations resulting from the many wars of the century are also shown in these atlases. The atlases, then, complement the sheet maps in the CHL and depict the Southwest, as well as other regions of the world, over time.

In addition to the collections the CHL is building, the library also sponsors outreach programs aimed at informing and educating both scholars and the general public of the importance of maps in the research process. To this end, the library mounts exhibitions, hosts symposia and public programming, publishes exhibition catalogs and articles on cartography, provides tours of the facility, and offers instruction in the use of the collection and the incorporation of maps in historical research.

The CHL has experienced steady growth since its founding in 1976. Its collecting focus has broadened from regional cartography to encompass general cartographic history and United States school atlases and geographies. In its first fifteen years, the library has developed into a unique resource in the Southwest due, in large part, to the support of the UT System, the UT–Arlington administration, the scholarly community, generous donors, and local foundations. The next fifteen years hold great promise for the library as it endeavors to further develop its holdings and provide increased access to them.

Tools of the Trade 2, *continued...*

The Natural (Map) Scale Indicator

(*Meridian 5*, 1990, page 111)

The Natural Scale Indicator, a creation of S. Whittemore Boggs, is no longer available from the U. S. Department of Commerce. The heavy paper copies which had been distributed by the National Ocean Service (NOAA) are out of print.

A *Map Scale Indicator*, with the four scales (latitude, kilometers, miles and feet) photomechanically produced on stable base polyester film with a matte finish, is available from the Memorial University of Newfoundland Cartographic Laboratory. **Prepaid** orders for $7.50 (US) should be sent to:

Professor Clifford H. Wood, Director
MUNCL, Department of Geography
Memorial University of Newfoundland
St. John's, Newfoundland A1B 3X9, Canada

Louisiana Coastal Geographic Information System Network (LCGISN):

Access to Spatial Data

Randolph A. McBride,[1] Donald W. Davis[1], Farrell W. Jones,[2] Mark R. Byrnes[1], Dewitt Braud,[3] Matteson W. Hiland[1], Anthony J. Lewis,[4] and Henry R. Streiffer[3]

Average shoreline retreat rates in excess of 10 m/yr and land loss rates of about 100 km²/yr are common for the Mississippi River delta and chenier plains. These changes have immense environmental, economic, social, political, and public-safety ramifications for the state and nation. To assess the potential risk these factors pose to Louisiana's citizens, coastal information regarding direct and indirect causes needs to be compiled. Although much coastal information exists, Louisiana has neither a central GIS repository for coastal data nor an organized mechanism by which this information can be accessed or shared locally, regionally, nationally, or internationally for use in addressing coastal issues. In response, the Louisiana Geological Survey, the Louisiana State University (LSU) Department of Geography and Anthropology, the LSU CADGIS Research Laboratory, and others, through funding provided by the United States Geological Survey, are developing the Louisiana Coastal GIS Network (LCGISN) to provide electronic access to geographic information available on different types of media, such as maps, photographs, satellite imagery, videotape surveys, textual attributes, and tabular data for Louisiana's coastal zone.

Recent studies indicate that coastal Louisiana has one of the world's most rapidly changing shorelines with retreat rates exceeding 20 m/yr in some areas.

INTRODUCTION

Coastal erosion and wetland loss are among the most pressing environmental issues of national importance with long-term economic and social consequences. With about 40% of the U.S. coastal wetlands, Louisiana sustains a renewable natural resource base valued at more than $1 billion annually (Turner and Cahoon 1988). The Mississippi River delta and chenier plains produce over 25% of the nation's fish harvest, its largest fur harvest, the highest concentration of waterfowl, and the largest recreational marine fishery in the United States (Davis 1983, 1990). In addition, approximately 70% of the outer continental shelf oil and 90% of its natural gas are produced in offshore Louisiana. These mineral fluids are transported through the wetlands in an extensive network of pipelines to processing plants that support a national and international industrial infrastructure (Turner and Cahoon 1988). However, parts of this productive ecosystem are in danger of extinction. Recent studies indicate that coastal Louisiana has one of the world's most rapidly changing shorelines with retreat rates exceeding 20 m/yr in some areas (Penland and Boyd 1981; McBride et al. 1991). Wetland habitats protected by outer coast deposits are being replaced by open water at a rate of 130 km²/yr when estimates of the Mississippi River delta (Gagliano et al. 1981; Britsch and Kemp 1990) and chenier plains (Gosselink et al. 1979; Dunbar et al. 1990) are combined.

Coastal change is caused by a complex interaction of natural and

Coastal change is caused by a complex interaction of natural and human-induced processes.

human-induced processes. Numerous causes have been identified for the deterioration and/or destruction of Louisiana's marsh vegetation, interdistributary wetlands, and shoreline deposits (Turner and Cahoon 1988; Coleman and Roberts 1989; McBride et al. 1991). Most of these causes are related to hydrologic and sedimentologic imbalances resulting from rising relative sea level (Penland et al. 1990; Boesch and Levin 1983), intrusion of salt water (Wang 1987), reduced sediment supply (Meade and Parker 1985), and human modification of regional and local hydrology and sediment distribution for purposes of flood control, navigation, or mineral and fuel extraction (Swenson and Turner 1988; Turner and Cahoon 1987). Natural causes for these imbalances include compaction and differential subsidence, sea level change, episodic catastrophic events (e.g., hurricanes), geosynclinal downwarping, and long-term climatic cycles. Human-induced causes of wetland loss include restricting the flow of annual spring floods using levees for flood control, dredging of navigation and oil and gas canals, and sub-surface fluid withdrawal.

Many site specific and regional studies, as well as mapping projects across many disciplines, have been completed for Louisiana's coastal zone.

Many site-specific and regional studies, as well as mapping projects across many disciplines, have been completed for Louisiana's coastal zone. However, Louisiana has neither a dedicated geographic information system (GIS) to compile this coastal information nor an organized mechanism by which these data can be accessed locally, regionally, nationally, or internationally. As a result, much coastal information exists, but many people are unaware of its existence or unfamiliar with the coastal-related repositories scattered throughout Louisiana. For the first time, a coastal GIS repository, network, and an information access interface are being designed and developed to create the Louisiana Coastal GIS Network (LCGISN). The purpose of LCGISN is to implement a system for information access that provides references and sources to spatial data and that links existing GIS data bases.

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Background

In response to Louisiana's coastal land loss problem, the United States Geological Survey (USGS) established a cooperative research initiative with the Louisiana Geological Survey (LGS) and Louisiana State University (LSU) to investigate critical processes of barrier shoreline erosion and wetland loss. This joint effort focused on understanding the problem from geomorphic, stratigraphic, process, and cultural impact points of view. In addition, other local, state, and federal projects are underway to study and map additional natural and cultural resource characteristics of the coastal zone. The product of these various research activities is the largest multidisciplinary coastal data base in the United States. A considerable amount of these data have been collected, analyzed, and archived; however, much of the information is not catalogued properly or linked to an electronic data base effectively. Furthermore, these data come in a wide variety of media types, including digital maps, high-resolution seismic profiles, vibracores, aerial videotape surveys, satellite imagery, tabular records, high- and low-altitude photography, and field surveys. Unfortunately, much of the digital data is unknown to other agencies or inaccessible due to

[1] Louisiana Geological Survey, Coastal Geology Section, Box G, School of Geoscience, Louisiana State University, Baton Rouge, LA 70803
[2] CADGIS Research Laboratory, College of Design, Room 216, Louisiana State University, Baton Rouge, LA 70803
[3] Decision Associates, Inc., 1276 Sharynwood Drive, Baton Rouge, LA 70808
[4] Department of Geography and Anthropology, Louisiana State University, Baton Rouge, LA 70803

storage medium, data structure, or hardware platform. To organize these diverse, multi-agency data sets into an automated access system, the USGS has committed funds to establish the LCGISN for data access and retrieval.

... the LCGISN is not another GIS, but rather a computer network that provides users a mechanism to access geographic information.

Project Objectives

The primary objectives of the LCGISN are to 1) improve communication among coastal scientists, planners and managers, local, state, and federal agencies, and private groups who need information to address Louisiana's land loss problems; 2) simplify the integration of environmental data from a variety of sources; 3) eliminate duplication of effort so funds can be spent more efficiently; 4) identify the most important data bases in existence and incorporate them into the GIS network as digital information; 5) promote networking and digital data exchange among different machines, systems, and institutions that use coastal information; 6) establish standard data exchange formats and data quality standards; 7) develop guidelines for cataloging different media (maps, photographs, satellite imagery, videotape surveys, textual attributes) and establishing data set ancestry; 8) develop a user interface that provides access to spatial data; 9) publish a GIS newsletter; and 10) assist other organizations in developing effective GIS strategies. Overall, the LCGISN is not another GIS, but rather a computer network that provides users a mechanism to access geographic information.

GIS technology provides researchers and managers the automated approach necessary to address specific needs associated with spatial data management and integration, but the computer technology is only as good as the source material utilized.

ACCESS TO GEOGRAPHIC INFORMATION

Traditionally, geographic information has been stored in the form of maps and accompanying memoirs. This was an acceptable approach two decades ago, but advances in computer technology have made it possible to collect, store, and update this information in digital format quickly and effectively. Consequently, planning and management decisions have come to depend on expeditious and reliable access to this information. GIS technology provides researchers and managers the automated approach necessary to address specific needs associated with spatial data management and integration, but the computer technology is only as good as the source material utilized.

Geographic Information Systems

The commonly accepted definition of a GIS is a computer-based system used to capture, store, edit, display, spatially analyze, and output geographically referenced data (Burrough 1986; Korte 1991). This definition encompasses computer-assisted mapping (CAM), computer-aided design and drafting (CADD), automated mapping and facilities management (AM/FM), and others, but each of these computer mapping packages falls short of being a true GIS because they lack the essential component of spatial analysis.

Computer-assisted mapping includes CADD and computerized cartography. This technology focuses on 2D/3D engineering design, coordinate definition, transformation, and map production. However, CAM generally is not suited for analyzing map data. In a CAM system, map features (points, lines, polygons, and text) are divided into separate themes, using layers or levels, and referenced to a common geographic coordinate system. Because detailed relationships among map features are not defined, spatial analysis is not possible. An AM/FM system also is based on CADD technology, and often is used to manage public utility data with emphasis on data storage, retrieval, and reporting. In other words, an attached data base enables nongraphic attributes to be linked with graphics. As a result, geographic queries are possible but full spatial analysis is not.

In a GIS, spatial relationships among all data elements are defined in a topological structure that creates intelligent data links.

In a GIS, spatial relationships among all data elements are defined in a topological structure that creates intelligent data links. Topological information refers to facts about spatial units and their boundaries (non-graphical attributes) that are unaffected by distortions (Logan and Bryant 1987). Geographic information systems software is designed to permit routine examination, transformation, and analysis of spatial and attribute data and is particularly suited to performing complex geographic and spatial functions that require Boolean or mathematical association of attributes from multiple overlays. Some examples of GIS software packages are Intergraph's Modular GIS Environment (MGE), ARC/INFO by Environmental Systems Research Institute (ESRI), Environmental Resources Data Analysis System (ERDAS), InfoCad by Digital Matrix, and Map Overlay Statistical Software (MOSS). Korte (1991) describes four primary advantages of a GIS over traditional methods of natural resource assessment 1) more secure and better organized map data, 2) elimination of redundant map information and multiple map sets, 3) more efficient and faster map revisions, and 4) ability to search, analyze, and present a large amount of diverse data. In addition, application of this technology provides a mechanism for increased productivity and data integration throughout local, state, and federal agencies, and private industry. Within this framework, the LGS is designing project-specific applications for incorporation with the LCGISN. For example, a shoreline change GIS strategy (Figure 1) for compilation of map data and analysis of historical trends has been developed to accommodate the extensive shoreline position data set for the outer coast of the Mississippi River delta plain.

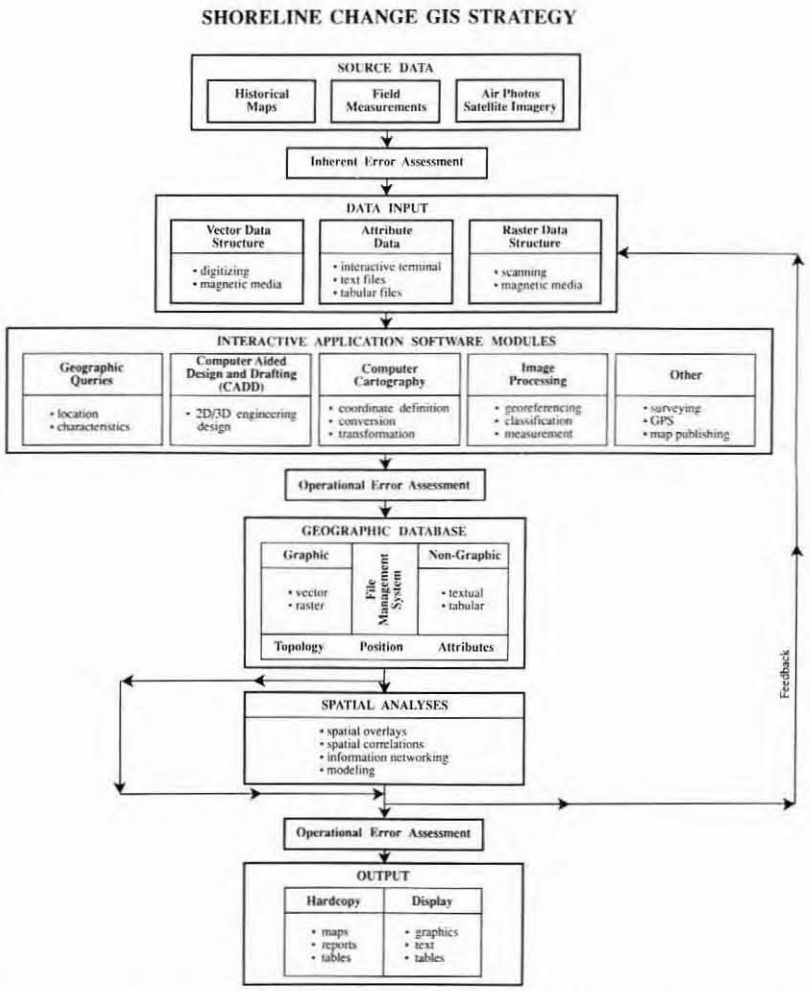

Figure 1. Strategy for compilation and analysis of historical shoreline postion data (from Byrnes et al. 1991).

GIS Networking

With increased availability of GIS applications software, more geographic information is processed each day. Managing this growing volume, so that access to spatial data is maintained, requires powerful computer processing and large computer data bases that are linked over a network. Without this capability, the large quantity of spatial data is unmanageable and becomes disorganized and inefficiently accessed. Holmes (1990) discusses the need for better access to and management of geographical information and outlines six reasons for networking 1) the volume of geographic information is immense, 2) it allows integration of diverse geographic information, 3) more information is gained about an area of

Access by the general public to geographic information and spatial data ... is made easier with modern technology.

interest, 4) it provides an efficient method to manage and monitor human activities, 5) all information is shared equally, and 6) remote access to otherwise unaccessible geographic information is established. As an example of expanding data availability, the Earth Scan Laboratory of LSU's Coastal Studies Institute receives real-time satellite data approximately seven times a day that consists of 840 megabytes of raster data that must be archived. Moreover, aerial photography, video imagery, new maps, and vast quantities of environmental data are compiled or created daily.

The LCGISN consists of a Management Council, a network core group, a technical GIS group, and two independent advisory groups.

The integration of geographic information from various formats, software packages, and hardware platforms is a problem, but numerous translation programs now exist or are being developed to help solve these incompatibilities. In addition, digital information from various disciplines need to be integrated.

With computer processing and networked data bases, more information can be gained about a specified location. Numerous secondary and tertiary maps, as well as tabular data, can be derived from superimposing independent data sets, such as historical shoreline positions (Figure 2). Distance and areal measurements can be evaluated to quantify the magnitude of change. The influence of cultural activities (e.g., beach fills, coastal structures) can be linked with measured change to propose potential cause-and-effect relationships.

Access by the general public to geographic information and spatial data using modems or networks is made easier with modern technology. This allows more information to be obtained by those people who previously were unable to gain access because of distance, document rarity, or incompatibility. Finally, remote access to numerous collections, museums, archives, and repositories from a single computer terminal is possible regardless of media type.

ORGANIZATIONAL FRAMEWORK

The LCGISN consists of four major components: 1) a Management Council, 2) a network core group, 3) a technical GIS group, and 4) two independent advisory groups (Figure 3). These interactive components are centered around the LGS, which is the headquarters for LCGISN.

The **Management Council** provides guidance for LCGISN and consists of a representative from each member organization (LGS, LSU Department of Geography and Anthropology (G&A), LSU CADGIS Research Laboratory, LSU Coastal Studies Institute (CSI), LSU Remote Sensing and Image Processing (RSIP) Laboratory, and Coastal Management Division (CMD) of the Louisiana

Figure 2. Shoreline changes between 1887 and 1988 for the Isles Dernieres, Louisiana (from McBride et al. 1991). The 1887 shoreline was digitized from historical topographic sheets published by the U. S. Coast and Geodetic Survey. The 1988 shoreline was derived from black-and-white, near-vertical aerial photography rectified using a Zoom Transfer Scope.

Department of Natural Resources) plus three *ad hoc* representatives (Office of the Governor, USGS, and the U.S. Fish and Wildlife Service, USFWS). The Management Council is chaired by an LGS representative. Two more *ad hoc* members, the U.S. Army Corps of Engineers and the Louisiana GIS Task Force, will be added in the near future. The Management Council meets on a regular basis to review operational procedures, monitor LCGISN developments, update policies, and serves as an important sounding board for incorporating various elements into LCGISN.

The **network core group** (LGS, CADGIS, G&A, CSI, RSIP, and CMD) forms the foundation of LCGISN. Together, they not only provide the major coastal data bases, but they also furnish computer mapping, remote sensing, and GIS expertise, teaching and training facilities, and a large graduate and undergraduate support staff. The **technical GIS group** meets bi-weekly and is responsible for designing, developing, implementing, and operating the user interface, central GIS facility, and user network. This group consists of experts from the network core group and currently two private consulting companies, Decision Associates and Information Research. Decision Associates specializes in GIS solutions, spatial analysis, and programming, while Information Research consists of professional librarians with expertise in computer on-line searches, standardized bibliographic records, and cataloging. Together, the technical GIS group specializes in computer hardware and software, GIS, remote sensing, computer mapping, coastal geomorphology, geography, and library science. Currently, Intergraph's Modular GIS Environment, ESRI's ARC/INFO/Oracle, and Digital Matrix's InFoCAD are being tested in-house to determine the primary GIS platform LCGISN will utilize. It is possible that each of these GIS packages will play a role in LCGISN.

Setting up a GIS takes trained personnel, time, and financial resources. Therefore, dedicated upper management personnel are needed for long-term success.

Coordination with other GIS laboratories, agencies and groups is critically important to avoid redundancy and to better spend financial resources.

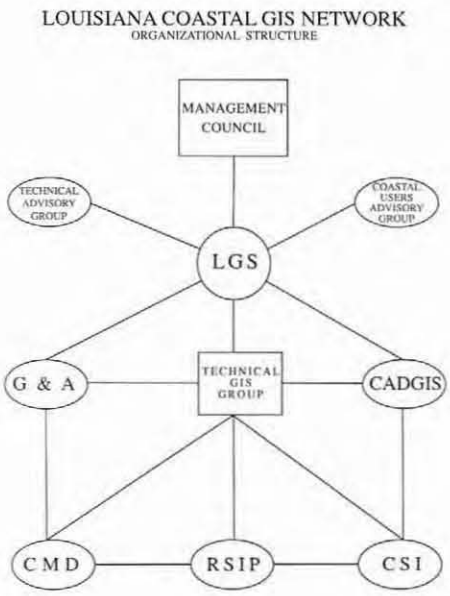

Figure 3. Major components and organizational structure of the Louisiana Coastal GIS Network.

Furthermore, two important but independent advisory groups for LCGISN were organized at the Sixth Annual Remote Sensing/GIS Workshop for coastal management held at Louisiana State University in April 1990 1) **Coastal Users Advisory Group** and 2) **Technical/Applications Advisory Group** (Figure 3). These advisory groups will convene at least once a year at the annual Remote Sensing/GIS Workshop to assist in providing current information on coastal data bases and projects, and defining the objectives and future direction of LCGISN in terms of hardware, software, and coastal data bases. It is anticipated that this annual meeting will promote the use and exchange of spatial data and improve communication among individuals, organizations, and agencies working in Louisiana's coastal zone.

PROJECT DEVELOPMENT

The preliminary results of LCGISN are summarized below in terms of project coordination, technical considerations, and hardware, software, and networking decisions.

Setting up a GIS network takes trained personnel, time, and financial resources. This section provides insight into some of the coordinating efforts, required decisions, and obstacles encountered to date.

Project Coordination

The LCGISN Management Council was established in the fall of 1989 and held its first meeting on November 17, 1989. This first meeting was attended by thirty-two people representing numerous federal, state, and university organizations. The LGS Director and State Geologist chaired the meeting with specific presentations by the LSU Office of Telecommunications, LSU's Department of Geography and Anthropology chairman, and a USGS representative from the Geologic Division. The meeting continued with a project review including purpose, participants, organization, and goals, and concluded with an open discussion by all participants.

Some important technical decisions must be made in the initial stages of any GIS project. One of the most important is deciding the primary data sets to be initially incorporated into a GIS and made available over a network.

Two important GIS groups exist in Louisiana with which LCGISN closely interacts, the Louisiana GIS State Task Force and LSU's Remote Sensing/GIS Coordinating Council. The GIS State Task Force was started by a group of state agencies who were interested in coordinating the state's GIS efforts. A representative from the Louisiana Department of Transportation and Development (DOTD) heads the task force. The Task Force's primary goal is to establish a fully funded statewide GIS consisting of the appropriate state agencies. Once this GIS is implemented, the LCGISN will become a specialized component of the Louisiana GIS Task Force. An LGS representative attends the bi-weekly GIS Task Force meetings to insure coordination between these projects. The Remote Sensing/GIS Coordinating Council meets monthly to discuss various issues relating specifically to computer mapping, remote sensing, and GIS activities at LSU. Moreover, this council coordinates potential GIS contracts among the various campus laboratories. An LGS representative is a voting member of the council.

Another important GIS activity within Louisiana is the annual Remote Sensing/GIS Workshop. The Sixth Annual Remote Sensing/GIS Workshop was held in April 1990 at LSU. The Department of Geography and Anthropology, DNR's Coastal Management Division, and the U.S. Fish and Wildlife Service were the workshop's primary organizers. The LGS organized the special half-day session on LCGISN and representatives from the DTOD and Coastal Environments, Inc. (a private consulting firm), co-chaired the Coastal Users Advisory Group, while a representative from LSU's Coastal Fisheries Institute chaired the Technical/Applications Advisory Group. Overall, this workshop provides a technical forum for communicating ongoing remote sensing/GIS projects in Louisiana's coastal zone, and provides the entire Louisiana remote sensing/GIS community with a voice directing the future of LCGISN.

Technical Considerations

Some important technical decisions must be made in the initial stages of any GIS project. One of the most important is deciding the primary data sets to be initially incorporated into a GIS and made available over a network. Numerous spatial data sets exist for coastal Louisiana, few of which are in digital format. It was decided to identify the most important data sets that should be available through the LCGISN regardless of current status and rank them according to need. This identification and ranking (Table 1) was accomplished during a Data Set Decision Workshop conducted by Decision Associates, Inc. The half-day session was attended by 16 representatives from various local, state, federal, and university organizations who have direct interests in Louisiana's coastal zone. The del-

egates proposed and ranked 27 significant data sets. Table 1 lists the major data bases identified as significant to the user community. Other data sets, not ranked but pertaining to Louisiana's coastal zone, can be identified and, where appropriate, added to the data base.

A spatial index/ bibliography of spatial data was considered one of the top ranked data sets. This emphasizes the fact that public access to maps and spatial information depends on a link among standardized bibliographic records, spatially indexed maps, and online vector/raster data.

Table 1. Ranking of data sets to be captured by LCGISN.
(identical numbers mean equal ranking)

1. spatial index/bibliography of all data
1. U.S. Geological Survey 7.5' quadrangle maps
2. water quality/chemistry
3. Wetland Inventory Ecological Characterization maps (USFWS)
3. hydrography and hydrology
3. geologic and engineering framework data
3. mineral extraction data and maps (aggregate, oil, gas, sulfur, etc.)
4. land use maps
4. biological survey data
5. bathymetry
5. soil types
6. point source discharge data
7. land loss maps
8. weather records and maps
8. canal and pipeline data
8. Federal and state physical regulations (permits, violations, mitigation)
9. shoreline change and geomorphology
9. land cover data (thematic mapper)
9. ownership
9. habitat sensitivity maps
10. National Resource Inventory data (SCS)
10. census data (TIGER files)
10. potable water sources
10. recreational use
10. economic zones
11. naturally occurring radiologic material
11. disease mortality

A spatial index/bibliography of spatial data was considered one of the top ranked data sets. This emphasizes the fact that public access to maps and spatial information depends on a link among standardized bibliographic records, spatially indexed maps, and online vector/raster data. Therefore, professional librarians will assist in establishing a framework for cataloging various media. Their tasks include integration of a controlled keyword vocabulary and standardized bibliographic records. Additionally, each collection of materials to be included in LCGISN must be reviewed to assess present bibliographic access, location and order of the items, and physical format of the items.

Bibliography Development. From the Data Set Decision Workshop in November 1989, it was determined that public access to maps and spatial information hinges on an online link to standardized bibliographic records, spatially indexed maps, and online vector/raster data with the ability to access these records automatically given geographic coordinates, location, or area of interest. To assist with this task, professional library advice was solicited. The LSU's professional library staff introduced the technical GIS group to the machine-readable cataloging format (MARC), the standard cataloging format used by libraries nationally and internationally. MARC also has a special category relating specifically to cartographic materials.

From this initial involvement it was evident that the LCGISN needed additional expertise in library science and information exchange. This led to detailed discussions with Information Research that focused on the MARC format and other GIS-related bibliographic projects, such as CartoNet, GRIN, Geodex, Image Query, and the USGS cataloging procedures (Morris 1988; Special Libraries Association 1988; Research Libraries Group 1989; Slavney and Guinness

1989; Holmes 1990). As a result, Information Research was asked to assist in establishing cataloging procedure for various media (maps, satellite imagery, aerial photography, aerial videotape surveys, textual data). Their task included the integration of a controlled keyword vocabulary and standardized bibliographic records. Additionally, each collection of materials contained in the LCGISN was reviewed to assess present bibliographic access, location, physical format, and other reference items deemed necessary for creating a complete record or bibliographic citation. Exposure to the MARC format made it clear that the bibliographic component of the LCGISN needed to follow a standardized format. The goal is to guarantee that 1) records for different types of media can be exchanged nationally and internationally, and 2) these bibliographic records can be linked to spatially indexed maps and imagery.

Figure 4. Example prototypes of the LCGISN graphical user interface showing the main menu for access to network operations and the search menu for locating different types of media.

Digital Base Map. The digital base map for LCGISN has been selected and will consist of several data layers, including 1) USGS 7.5' quadrangle boundaries, 2) land/water boundary derived from thematic mapper data (1990), 3) state political and legal boundaries, 3) parish (county) boundaries, and 4) major transportation routes (e.g., roads, railroads, etc.). In Louisiana's coastal zone, the land/water boundary on USGS 7.5' quadrangle maps are outdated because of the dynamic nature of this wetland environment coupled with high rates of coastal erosion and land loss. In some cases, shorelines on coastal quadrangle maps (e.g., central portion of the Chandeleur Islands) are 30 years old. The average shoreline retreat rate for the Chandeleur Islands is 6.5 m/yr, resulting in shoreline retreat of about 200 m since the last map update. This causes unacceptable map inaccuracies. Therefore, thematic mapper data from EOSAT will be utilized as a raster image backdrop with the land/water interface processed into a line. Thematic Mapper data can be updated when needed to reflect continuous changes in Louisiana's coastal zone.

Menu Development for the User Interface. Menu development reflecting functionality goals has been the primary area of concern, and has served as the technical group's principal focus. In designing the menu architecture, the technical committee thought it absolutely imperative that the LCGISN be easily accessible by a wide variety of users.

Poor menu design will only complicate presentation and confuse those individuals for which the system is being established to assist. Considerable time and effort were spent creating a set of menus that will provide access to the network data base with minimal effort from the user requesting information (Figure 4). This approach has produced a comprehensive set of menus based on careful discussions of the network's purpose. The technical GIS group is structuring a system that will work with spatial and textual data at a scale that has not been implemented elsewhere.

HyperCard software, running on a Macintosh, was used to develop prototype menus. At present these menus are being implemented on Unix-based workstations.

After some of the general goals, functions, and concepts concerning the LCGISN were agreed upon, a literature search was conducted to identify similar systems that electronically accessed geographic information. While several references were found concerning map indexing systems, our investigations showed that some have not been implemented and others work only on personal computers. Also, we found the designs lacking in several key areas where we need capabilities. At this point we decided to begin with a new design. HyperCard on a Macintosh was used to develop a prototype for the initial phase of menu design.

Develop an indexing and geographic search system for maps, photographic products, and imagery referenced by geographic location, and allow interactive searches specified in a variety of ways from geographic windows, coordinates, or names.

The first two menus will introduce the system. A help command has been incorporated into the display to assist the user. This feature will allow users to gain access to a particular type of material requested. The main menu will open the system files and provide information and the key subject headings to gain access to specific textual and spatial data sets. After a command is selected from the main menu, the user will be able to move through the data by focusing on topics that are of interest in the subsequent menus. As new menus are selected, the topics become more focused; the end result is a customized path into the data base. The user will see a display of a reference map and will be able to browse through a reference file of images and text based on a minimum bounding rectangle, screen display of latitude and longitude, or place name. Image information and textual data will be shown on the terminal simultaneously in a window environment. Once a pathway is established, the key sequence will be saved and can be replicated or modified for future reference. In addition to menus producing text, map information will be available to help locate specific points. Where possible, bibliographic citations will be tagged with geographic coordinates, specific place names, or parish (county) names. The graphics data and citations will be available to the user in digital form or as a hard copy.

Development of the prototype menu system began with a list of general functions the designers thought were essential to fulfill the primary role of the LCGISN. These were stated as follows:

1) Provide basic information about the LCGISN and on-line help facilities for using the system.
2) Provide a directory of affiliates and associates involved in coastal activities within university, government, private, foundation, and non-profit organizations.
3) Maintain computerized bibliographic records of publications pertaining to coastal Louisiana.
4) Develop an indexing and geographic search system for maps, photographic products, and imagery referenced by geographic location, and allow interactive searches specified in a variety of ways from geographic windows, coordinates, or names.
5) Provide display and query capabilities of the LCGISN primary GIS digital data bases along with minimal spatial calculations and statistical analyses.

6) Provide translation routines to convert data from one GIS system to another.
7) Provide projection transformation capabilities.
8) Allow for user customized procedures and customized environments.
9) Allow for electronic mail and other convenient utilities.

From this list of primary functions, a more detailed operational menu system was derived to prototype the concepts. Hierarchical menus were developed in a series of meetings with the technical GIS group, during which the prototype evolved to its current state. Each primary menu was given major emphasis with personnel assigned to develop specific categories for each primary sub-menu. The system's functions were outlined in detail, critiqued, modified, and developed into hierarchical menus that were constructed on the Macintosh HyperCard system. This program allowed development of the menu system in a prototype environment, thus providing a first-hand look at how the overall system will function. Foremost in the minds of the designers was to create a user interface that had the qualities of simplicity, a standard language (in lieu of jargon), and avoidance of overly involved menu selections (that is, the necessity to make many choices to get desired results). These efforts strived for a balance of many concepts, including

Foremost in the minds of the designers was to create a user interface that had the qualities of simplicity, a standard language (in lieu of jargon), and avoidance of overly involved menu selections.

1) user friendliness versus capability of the system
2) non-technical verbiage versus precise technical language
3) use by non-technical and casual users versus complex use by researchers
4) simplicity versus high level of detail
5) generalized interface versus reduced levels and number of menus
6) default input versus user control.

In addition to development of the functions implicit in the menu choices being offered, other considerations given to the system's design and operation are dependent upon factors related to the selection of GIS software:

- Ability to add functions and commands to the menu interface that are not inherently part of the GIS system.
- Ability to interface to a relational data base.
- Ability to display raster images.
- Standard query language (SQL), ad hoc or 4GL interface.
- X-Windows server support.
- Multiple read access to the same GIS data base.
- Layering and graphic overlay to display device.
- Use of Network file system (NFS) and server.
- Functionality under UNIX Operating System.
- Simultaneous display of vector and raster data.
- Interactive map query facility.
- Potential for program running in UNIX to call the GIS or GIS process.
- Map organization, tiling and systematic retrieval.
- Scale dependent data, graphic and textual suppression.
- Display and data base query speed.
- GIS graphic and data base conversion utilities.
- Provisions made for various media types and formats.
- Operation over networks.

Hardware, Software, and Networking Decisions

LCGISN has purchased two GIS systems that currently are operating in-house, Intergraph's Modular GIS Environment (MGE) and ESRI's ARC/INFO. Below is a short discussion of these two GIS packages, the hardware platforms they are operating within, and how they are networked.

LSGISN has purchased both Intergraph's Modular GIS Environment (MGE) and ESRI's ARC/INFO.

Intergraph's Modular GIS Environ-

MGE is a set of integrated computer software tools. MicroStation 32 provides complete CADD capabilities. Projection Manager provides comprehensive coordinate definition, conversion, and transformation capabilities.

ment (MGE). This software system is running on an Intergraph InterView 32c, Unix-based workstation that has 16 MB of primary storage and 250 MB of secondary storage. The workstation has a high-precision, large-format digitizing table (48 X 60") with a large-format Hewlett-Packard 8 color pen plotter (model 7595) for output. MGE is a set of integrated computer software tools, capable of handling all GIS functions in a common, interactive, workstation environment. MGE/SX is the base GIS software environment of the MGE product line that provides the primary user interface, basic data management and input tools. Software modules are available that reside within the MGE/SX environment, including photogrammetry, computer cartography, image processing, surveying, terrain modeling and analysis, geotechnical mapping, and subsurface exploration.

MGE Analyst uses geographic data to create topological relationships for use in spatial analyses and for input to other Analyst processes.

The modular environment of MGE means users can expand a system where needed and when financial resources are available. For LCGISN, three modules were bought with the initial acquisition of MGE, including MicroStation 32 (MS), Projection Manager (PM), and MGE Analyst (MGA). MicroStation 32 provides complete CADD capabilities focusing on 2D/3D engineering design. Projection Manager provides comprehensive coordinate definition, conversion, and transformation capabilities for complete flexibility with projection, datum, and ellipsoid definition. It provides several methods for conversion between standard datums, such as North American Datum (NAD) 1927 and NAD 1983. Projection Manager also features least-squares-derived transformation of graphic data based on weighted control points and several transformation models. MGE Analyst uses geographic data to create topological relationships for use in spatial analyses and for input to other Analyst processes. Themes, such as historical shorelines, vibracore locations, seismic tracklines, surficial sediment samples, and hard mineral resource targets can be used to build integrated, topological data structures when required. Topological overlays can be quickly created as needed, reducing the number of steps in the workflow and the time required for completing GIS planning scenarios. Results derived from queries can be immediately used in further queries or transferred to other Intergraph applications for use in coastal engineering design and other scientific coastal research projects. Query results can be output as reports, new graphics files, or hardcopy maps.

ARC/INFO is a vector-based GIS for storing, analyzing, managing, and displaying topologically structured geographical data. The ARC/INFO system was developed to be a generic GIS. It includes geographic database generation and management, geographic analysis, geographic database manipulation, database query, graphic display, and report generation.

ESRI's ARC/INFO. ARC/INFO is a vector-based GIS for storing, analyzing, managing, and displaying topologically structured geographical data. The ARC system stores cartographic data, while the relational data base INFO stores attribute data. The ARC/INFO system was developed to be a generic GIS that could be applied to any geoprocessing task. It provides a large selection of commands that includes six general capabilities, namely geographic database generation and management, geographic analysis, geographic database manipulation, database query, graphic display, and report generation. After data capture, ARC/INFO supports data conversion to 50 map coordinate projections, as well as performing NAD27 to NAD83 geodetic datum adjustments.

Data editing capabilities include automatic detection and identification of digitizing errors, rubber sheeting, coordinate generalization, and feature snapping. ARC/INFO analysis functions include map overlay, buffer generation, map sheet manipulation, cartographic measurements, and tabular analysis. Graphic display and output can be controlled by tables that associate cartographic features with graphic symbols and shades. This software application currently operates on a

Sun SparcStation 1 system under UNIX.

Networking. Both GIS software packages are networked using LSU's campus-wide ethernet. MGE and the InterView 32c workstation are located at the LGS but are linked to an Oracle relational data base that resides on an Intergraph InterPro 6040 in the CADGIS Research Laboratory. This operation is completely transparent to the user and allows the InterView 32c workstation to have additional free disk space for specific coastal datasets instead of relational data base software.

LCGISN represents an information access system that provides users a mechanism for integrating spatial and textual data from multiple sources for Louisiana's coastal zone.

The ARC/INFO software package is running on a Sun 4/390 Server that services five Sun SparcStation 1 Unix-based workstations. The Sun Server is located in the Southern Regional Climate Center in LSU's Department of Geography and Anthropology. Server-based Oracle is the relational data base used with ARC/INFO thus making the system ARC/INFO/Oracle. The five Sun workstations are located remotely in four University computer laboratories, which include 1) LGS's Coastal GIS Research Laboratory, 2) G&A's Mapping Sciences Computer Laboratory, 3) the Knowledge-based Laboratory in Agricultural Engineering, and 4) G&A's Southern Regional Climate Center. Only ARC/INFO executable files are swapped on local disk space for each of the five Sun workstations; the five different seats of ARC/INFO/Oracle can operate simultaneously. This coordinated networking effort among four different University computer laboratories is more efficient, saves money, improves communication, and provides for better research. This type of networking is seen as the future for LCGISN.

By 1994, LCGISN will exist as an independent fully functioning system.

SUMMARY AND FUTURE DIRECTION

LCGISN represents an information access system that provides users a mechanism for integrating spatial and textual data from multiple sources for Louisiana's coastal zone. Organizationally, it consists of a management council, network core group, technical GIS group, and two independent advisory groups (coastal users and technical/applications). One of the top-ranked data sets identified for inclusion in LCGISN is a spatial index/bibliography for available data relating to Louisiana's coastal zone. Such an index will link true geographic location to maps, imagery, photographs, names, and bibliographic references to allow spatially defined geographic searches. An essential function of LCGISN is to connect existing GIS's and provide user access to spatial data available in different types of media.

To date the prototype user interface was designed, tested, and refined using HyperCard running on a Macintosh. Unix-based workstations and GIS software were acquired, and the network core group was connected through LSU's campus-wide ethernet. The Management Council and two independent advisory groups were established and integrated with LCGISN. Currently, implementation of the user interface onto Unix-based workstations running X-windows is being completed. The major data sets identified and ranked will be further assessed and, where possible, imported into the system. In the future, work will focus on perfecting the user interface, acquiring or programming translation routines, cataloging various types of media, importing additional digital data sets, developing a computer bulletin board, and publishing a biannual newsletter. By 1994, LCGISN will exist as an independent fully functioning system.

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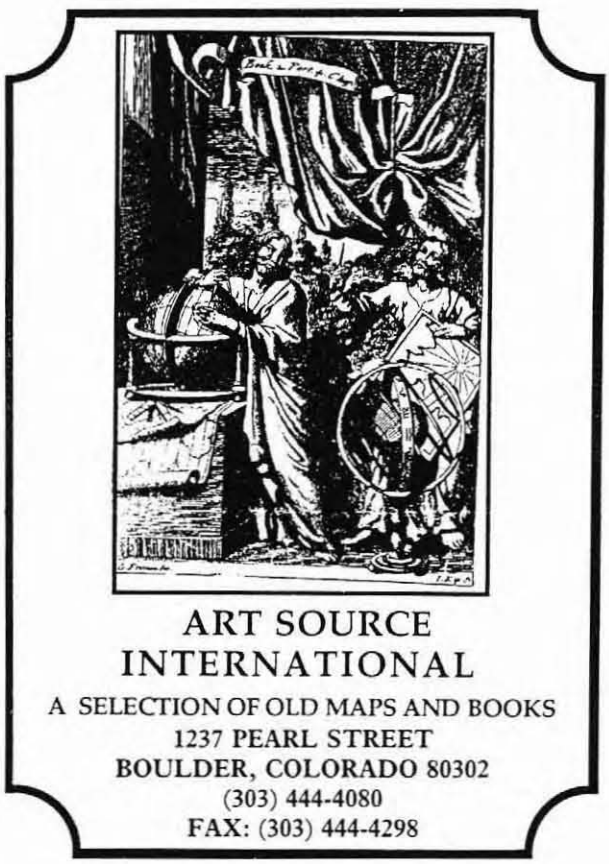

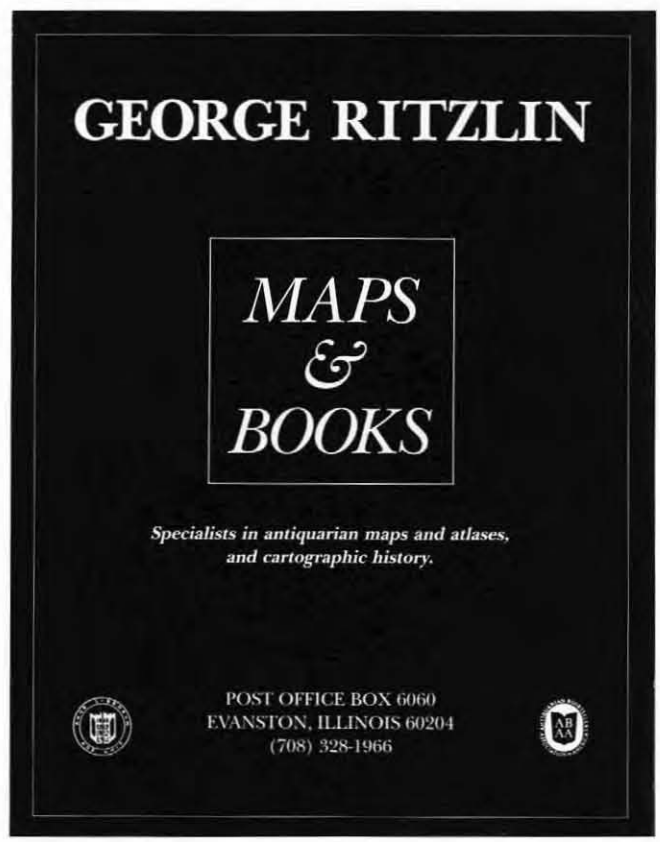

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BOOK REVIEWS

Blaeu's The Grand Atlas of the 17th Century World.

New York: Rizzoli International Publications, Inc., 1991. 224 pages.
ISBN:0-8478-1300-2. $60.00

Dutch Cartography

When the *Grand Atlas* was published in 1662, with its combination of old and new maps, it can truly be said to be both a review and a culmination of a half century of Dutch cartography.

The *Grand Atlas* or *Atlas Major* of Joan Blaeu, published in four editions from 1662 to 1668, was the culmination of the work of the Dutch cartographers of the sixteenth and seventeenth centuries. Because of an extensive guild system that produced quality engravers, governmental interest in navigation and trade (and, particularly, the Dutch East India Company), and skilled cartographers who were shrewd businessmen as well, cartography flourished in Holland from 1570 to 1670 and beyond.

Dutch atlas cartography had its beginnings with Abraham Ortelius who produced the first modern atlas, *Theatrum Orbis Terrarum*, in 1570. Mercator's *Atlas* (published in 1595) soon competed with the *Theatrum*. When Hondius bought the plates of Mercator, and used these and his own plates to develop new atlases (in 1607 and later), the standard work by Ortelius was finally superseded.

Beginning in 1604 Willem Blaeu published maps of atlas size and through 1630 Willem and Joan Blaeu published additional maps. Using their own plates and plates acquired from the estate of Hondius the Younger, the Blaeus published an *Appendix* in 1630 and another in 1631 which served as an update to Ortelius's *Theatrum* and Mercator's *Atlas*. In 1634 the Blaeus published their own atlas, and new editions followed in 1635 and 1640. Each new appendix and atlas contained most of the maps from previous editions, but many new maps were added to each revision. Atlas volumes of Great Britain, Scotland, and Asia were published in 1646, 1654, and 1655.

When the *Grand Atlas* was published in 1662, with its combination of old and new maps, it can truly be said to be both a review and a culmination of a half century of Dutch cartography.

The Grand Atlas

The *Grand Atlas* was a multi-volume set published in French, Dutch, Spanish and Latin editions, the largest being the 12-volume French edition. The maps follow the traditions of Dutch cartography and are rich in ornamentation; lavish wind roses and decorative cartouches adorn many of the sheets. The most expensive work printed in the last half of the seventeenth century, it was published as a limited edition and intended primarily to provide display pieces for the wealthy; it was often given as gifts by the Dutch government to visiting heads of state. "Patricians of the period had a propensity for pompous display, not the least in their libraries, and in this respect Blaeu's *Atlas Maior* suited their often rather snobbish tastes very well" (Koeman 1970, 41).

Rizzoli Publications has released an affordable collection of 100 maps from the *Grand Atlas*.

The audience for the *Grand Atlas* has expanded over the years from those with access to the original copies to those with access to the 1000 facsimile copies (produced by Theatrum Orbis Terrarum Ltd. in 1967-8) to those with access to this new volume of reproductions. Rizzoli Publications (along with Studio Editions Ltd., of London) has released an affordable collection of 100 maps from the *Grand Atlas*. The volume, published in co-operation with the Royal Geographical Society,

The maps are printed on a high quality paper and the photographic reproduction is excellent ...

Maps in the 1662 atlas included map plates from as early as 1608. This section of the 1617 map of Africa contains many of the characteristics of the early maps. Cartouches, such as the one shown at the top, generally surrounded the map. Other decorative features included ships, sea creatures and wind roses.

is an effort to make important cartographic items more widely available.

Blaeu's The Grand Atlas of the 17th Century World

The Rizzoli volume of reproductions contains 100 maps from the 600 maps in the nine-volume Dutch edition. Even though it is not a true facsimile atlas, it still provides an interesting glimpse into this ultimate expression of seventeenth century Dutch cartographers.

The volume begins with an "Introduction," a brief history of the Blaeu family printing business. "Presentation of the Atlas" contains information regarding publication of the *Grand Atlas*. This is followed by an "Arrangement of the Atlas" section which numbers the maps in this volume and provides reference numbers to the map plates. Each plate is identified according to its number in the Dutch (1664) edition (from which it was reproduced) as well as in the French edition of 1662. The reason given for providing each print's arrangement in the French edition is that this was, physically, the largest edition; the availability of the facsimile of the French edition (1967-8) is an equally compelling reason to provide this information.

The 100 double-page maps that follow comprise the major portion of the volume; informative notes accompany each plate. These notes, as well as the dozen pages of introductory materials, were prepared by John Goss.

The maps are printed on a high quality paper and the photographic reproduction is excellent, resulting in plates that are clear, sharply focused, and appealing to the eye. The maps in the original atlas (and in the facsimile) were generally uniform in size; in most cases the reduction appears to be uniform throughout this volume. However, a note concerning the exact degree of reduction would have been helpful. Deviations from the norm should have been

noted. This is especially necessary because the geographic scale, areal extent shown, and print size varies greatly from map to map in the *Grand Atlas*.

Although it is not severe or consistent, there is a gutter problem. With the binding in the center of the maps, some words and line work are often offset slightly; the problem is, alternatively, annoying and tolerable.

The discussion of each map is limited to two narrow columns on both sides of the maps. Seldom is this space used in its entirety. Since the maps cover a variety of geographic areas, a place name index would be useful, although this is outside the realm of the stated purpose of the volume. An index of this nature would expand the scope of the atlas and make it useful as an historical atlas as well.

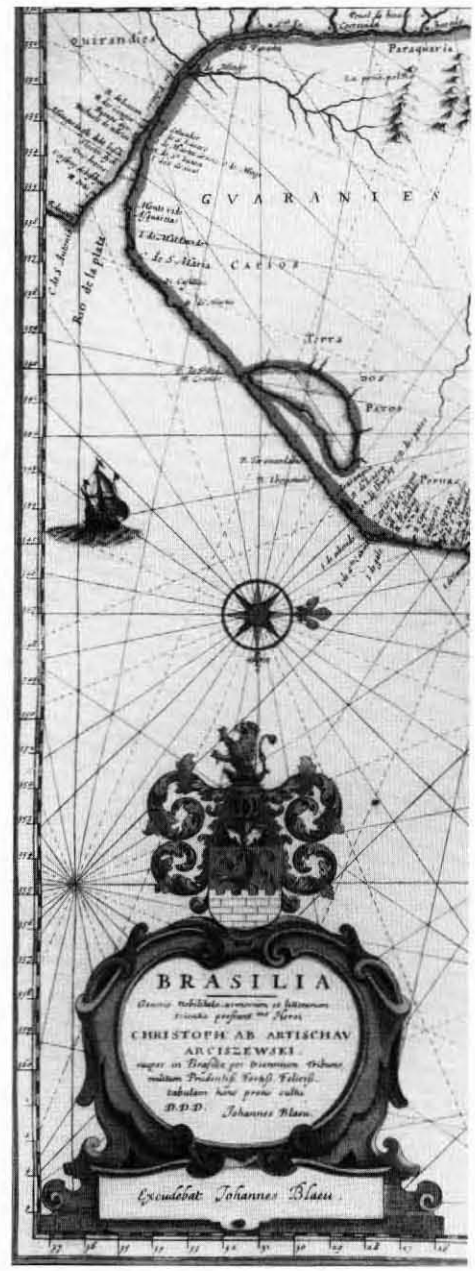
The list of twelve sources includes the major biographers of the Blaeu family as well as several other volumes discussing the cartography of the period.

Coverage

On the dust jacket, it is stated that "100 of the most important maps" have been selected for inclusion in *Blaeu's The Grand Atlas*. While the criteria for selection are never elaborated, it appears that the maps selected cover a cross-section of geographic areas and a span of years in terms of dates of publication of the original maps. The reader is provided with an overview of the half century of the works by Joan Blaeu.

... the maps selected cover a cross-section of geographic areas and a span of years in terms of dates of publication of the original maps.

While there is this temporal variety in the volume, there are instances where it is not accounted for. For example, the description of Map 8 is very thorough, identifying the original 1652 source. For Map 89, however, there is no discussion as to whether this map was the same one used in Blaeu's 1635 *Theatrum*, or whether it was an updated version of that earlier map. (One would assume that the map is an updated version



Brasilia, produced by Blaeu in 1642, has more topographic detail and less ornamentation than earlier maps. While navigation lines are included, the number of ships shown has decreased; sea creatures no longer appear.

because an apparent dedication by Joan Bleau is absent.)

Sometimes comments in the text do not seem to be pertinent. Incorporated within the text for Map 5 is a comment about Map 10 where three Swedish provinces—Estonia, Ingermanland, and Livonia—are not colored the same as Sweden. Because

most of provinces of Sweden on Map 10 are shaded differently, that criticism is inappropriate. Regarding Map 9, the author notes a boundary error—that Halland, Blekinge, and Skane are not shown to be incorporated into Sweden. It would have been most appropriate for the author to have informed the reader that the map was apparently first used in the 1634 edition of Blaeu's atlas, and that Blaeu did not update the map. This failure to update maps is common, and should be noted here and in other places where it arises. For example, the comments regarding Map 71 fail to mention that the map was not updated even though the discoveries of Champlain had greatly increased that information available to Blaeu about eastern North America.

Early and later maps differ strikingly in style and content.

Content

Although there are comments throughout, more attention could have been paid to changes in cartographic design. Early and later maps differ strikingly in style and content. For example, map 69 represents an early creation. Except for the Tropic of Cancer the map lacks parallels and meridians. Characteristic of Blaeu's early maps, it has decorative cartouches, compass roses, and characteristics of a portolan chart. In contrast, Map 68 was first published in the *Grand Atlas*. The text identifies it as a late addition and a good example of the different, and later, style of Blaeu. The map is less ornamental, has parallels and meridians, but no network of compass roses. It is interesting that in the progression from the early maps to the later maps there exists a middle period when the Blaeu maps of Great Britain, Scotland, and Asia show oceans mostly devoid of meridians, parallels, compass roses and ships. In this middle period, did Blaeu decide that his maps should be cleaner and that unimportant information should be deleted, and then later decide that certain information (meridians, parallels, and, in the case of Map 70, rhumb lines) and tasteful descriptive devices (ships) should be included? The notes about the end paper maps address the characteristics of the early and later Blaeu maps briefly. Additional information about these changes in style would have been helpful and interesting.

Blaeu's The Grand Atlas accomplishes its proposed goal: to make a major cartographic achievement available at a reasonable price to a wide audience.

A Few Concerns and Some Limitations

A few errors occur in the "Arrangement" section. Maps 6 and 9, as well as maps 56 and 57, are incorrectly identified as the other. Maps 22, 23, and 24 are incorrectly titled; Map 22 should read "Tertia pars Brabantiae," Map 23 should read "Caerte van de Scher-meer," and Map 24 should read "Brabantia Ducatus." Map 16 is incorrectly identified as Map 41 in Volume III of the French edition; it should have been identified as Map 55. These minor technical problems do not really affect the use of *Blaeu's The Grand Atlas*.

Though the maps are numbered in the "Arrangement" section, they are not numbered on each page. This makes use of the atlas somewhat awkward. One must jump from the "Arrangement" section to the Table of Contents in order to identify the map page.

Utility

Blaeu's The Grand Atlas accomplishes its proposed goal: to make a major cartographic achievement available at a reasonable price to a wide audience. This volume will be useful as a reference book for students of the history of cartography at the undergraduate and graduate levels. It will complement many reference collections by providing examples of the Dutch contributions to cartography.

It could be a volume around which to add other references for a more complete picture of the nature and the role of Dutch cartography from

While this volume will not replace the available originals or the facsimiles, it will provide improved access for the scholar and, in this attractive and reasonably priced format, no doubt promote a wider interest by the casual user.

While these two portions of maps appear on the surface to be similar, the complete maps reveal style changes. The lettering and symbology has changed little from the 1608 Willem Blaeu map of the Netherlands (top) to the 1662 map of Bremen (bottom). The differences involve less ornamentation around the edges of the map, fewer compass lines and increase in information about the land on the body of the map.

In the 1662 map (bottom) the gutter problem noted earlier is obvious. The original gutter on the left did not disturb the appearance and reading of the map. The new gutter on the right has offset lettering as well as offset features suc as islands and rivers. The problem is, alternatively, annoying and tolerable.

1500 to 1700. While this volume will not replace the available originals or the facsimiles, it will provide improved access for the scholar and, in this attractive and reasonably priced format, no doubt promote a wider interest by the casual user.

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Karen M. Trifonoff
Richard D. Sampson
Department of Geography
University of Kansas

The New Atlas of African History

By G. S. P. Freeman-Grenville
New York: Simon & Schuster, 1991.
144 pages.
ISBN: 0-13-612151-9. $65.00

Any new atlas of Africa provokes immediate interest. In this review, in addition to telling the reader about the content of Dr. Freeman-Grenville's new atlas, I propose to explore two related questions: 1) How does the new *Atlas of African History* compare with other historical atlases of Africa? and 2) Is it inevitable that historical atlases about Africa should reflect so dominantly the continent's history of contact with outside influences, particularly the various encounters with Europeans?

... [E]mphasis [is] given the early histories of Islam and Christianity ... and European exploration, trade, slaving, and colonization.

First to scope and content. The atlas contains 103 two-color (black and red) maps, generally on the righthand page, facing a page of explanatory text. Lorraine Kessel, who designed the maps, is thanked by the author as being "so elegant and perceptive an interpreter of what I have had in mind" (page 5). The maps were produced by Carta, The Israel Map and Publishing Company, Ltd., Jerusalem, and printed in Israel. The atlas is a considerable expansion and updating of an earlier atlas by Freeman-Grenville titled: *A Modern Atlas of African History* (Freeman-Grenville 1976). The maps are generally clean and readable and possess a kind of sturdy attractiveness. There is a simple, effective locational reference system in the index (e.g., Adam Kok 63 D2, referring the reader to a graticule square on Map 63).

The maps ... have a kind of sturdy attractiveness.

There is no explicit grouping of maps by topic or period, the presentation being strictly chronological throughout. The first map (with a covey of small inset maps which give some physical background) is called Africa, Physical. It is a political map with plastic relief suggesting terrain, and it shows the main rivers. This terrain underlay is used on many subsequent maps, both those of continental and regional scales. On some maps the shading obscures information (e.g., Maps 17, 18, 22, 23 and 28).

The second map then begins a sequence that opens with the "Early Stone Age" and ends with "Politics and Population, 1990." I searched for natural groupings and have come up with the following as a way of informing the reader about the content of the atlas (at right, number of pages devoted to the theme):

Prehistory	4
Early population movements	2
Antiquity	10
Spread of Christianity (and Vandal Period)	12
Arab conquest and trade, Islamic states	28
European expansion and trade	4
African kingdoms/states and trade	12
The slave trade	2
Principal African states and people, 1850	2
European settlement, colonization and trade	20
Merina expansion	2
Principal African resistance to European penetration	2
The Great War	4
Twentieth century colonial era	4
World War II	4
European predominance in Africa, 1950	2
Decolonization of Africa (with special emphasis on the Republic of South Africa and its neighbors)	10
Africa, politics and population, 1990	2

From this list we can see the emphasis given the early histories of Islam (28 pages) and Christianity (12 pages). From it we can see the coverage given European exploration, trade, slaving, and colonization (52 pages). That leaves about 32 pages for the rest of African history. Some 75 percent of the atlas is about

"encounter" and 25 percent is about "indigenous" history.

Africa is unusual, if not unique (India and southeast Asia come to mind), in that no place on earth has had such a profound experience of Europeans and yet retained a numerical dominance (numbers of people) and, more recently, gained control of its political destiny, although even that is in some doubt in this era of neo-colonialism. (The "discipline" of structural adjustment programs, forced on African countries by the International Monetary Fund and the World Bank, with its attendant economic austerity and diminution in state power, is a contemporary phenomenon.)

Some 75 percent of the atlas is about "encounter" and 25 percent is about "indigenous" history.

As Max Lerner observed: "The so-called lessons of history are for the most part the rationalizations of the victors. History is written by the survivors." For now the Europeans seem to have won and it is their story (or at least their viewpoint), that is, by and large, featured in atlases. This is not to gainsay the importance of these encounters—when they occurred and, for African societies and economies, even today. Yet an historical atlas of India would not exhibit anywhere near the same imbalance. Is it a matter of lack of documentation, incomplete scholarship, insufficient archaeological work, or something else? As Freeman-Grenville says "Laplanders and Greeks are both Europeans; Bantu, Berbers and Boers are all Africans" (page 5). Nevertheless, who gets the most attention is an interesting matter.

The atlas by Ajayi [in comparison] ... conveys a feeling of being by, for, and about Africa and Africans, and much less that of Africa as a stage for Europeans (and Arab) travel and encounter.

Would African atlas makers settle for the same mix? Two historical atlases which have Africans as senior author/editor are available for comparison (Ajayi, et al. 1985, and Kwamena-Poh, et al. 1982). The atlas by Kwamena-Poh and colleagues is a smaller two-color atlas (76 pages). The maps are more attractive, but curiously there is not much difference in coverage—the emphasis on European engagement with Africa is about the same as in the Freeman-Grenville atlas.

The atlas by Ajayi and colleagues is in a league (and no doubt a price) by itself. This folio-sized atlas has full-color maps, much useful interpretive text, the critical scholarship of a distinguished panel of Aricanists, and reproductions of wonderful old photographs and engravings. Yet the most interesting feature of this sumptuous atlas is the fact that it conveys a feeling of being by, for, and about Africa and Africans, and much less that of Africa as a stage for European (and Arab) travel and encounter.

Another atlas with which the Freeman-Grenville atlas may be compared is the now somewhat dated *An Atlas of African History* (Fage 1978). Fage's atlas has the greater clarity and elegance and generally comparable coverage, but it lacks the extended text. Most of its maps bear only titles, although in a few places there are captions or brief explanatory paragraphs.

There are only a few errors of commission in the Freeman-Grenville atlas, the most astounding being to state that the Niger flows west, not east (page 92). Guinea and Guine (Guinea-Bissau) get reversed at times (Maps 1, 94 and 100). Omission is a different story, but then all writing, all mapping requires choice. There is virtually no economic information in the atlas, and, as continues to be true of other atlases as well, women are nearly invisible. Just as there is little said about the various colonial policies (British, French, etc.), the contemporary structural deformities set in place during the colonial period do not figure in Freeman-Grenville's commentary. Similarly, southern Africa is discussed without reference to South Africa's role in the destabilization of its neighbors. Freeman-Grenville's historical imagination seems to be fired by earlier times; for the recent past, the viewpoint of a British traditionalist and conservative is evident.

All these comments made, I readily give much credit to Freeman-Grenville for creating a useful atlas. It is no doubt intended for school use, and it covers topics that are likely to be considered in class. Some parts of the atlas are particularly strong. The sections on Christianity and Islam are full, detailed, and interesting. One learns of fascinating syncretic exchanges between Christianity and Islam (page 30). The history in Africa of these religions, and the history of the Swahili coast have been Freeman-Grenville's special interests and lifelong objects of study. These are some of the best parts of the atlas and superior to the other atlases I have referred to in this review. The careful reader can profit much by reading this welcome addition to the historical atlases on Africa.

The sections on Christianity and Islam are full, detailed, and interesting.

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Philip W. Porter
Department of Geography
University of Minnesota
Minneapolis, Minnesota

Guide to U.S. Map Resources

Compiled by David A. Cobb. 2nd ed. Chicago: American Library Association, 1990. xvi, 495 pages.
ISBN 0-8389-0547-0. $65.00

Five years ago, the Map and Geography Round Table (MAGERT) of the American Library Association (ALA) published the first edition of the *Guide to U.S. Map Resources*. Unfortunately, the typography in that edition was much too homogeneous for a book intended for ready reference: the running titles at the top of the page got one to the state alright, but picking out the city names in an unrelieved column of grey print of uniform size and wight was tedious. The subject index, with barely 100 entries, was totally inadequate, and there was no index to personal names. In an unsigned review in *Mapline* (42 [June 1986]: 12), I was rather hard on the ALA effort and concluded that, if exiled to a desert island with only one directory of map collections, it would have been the Special Libraries Association Geography and Map Division's *Map Collections in the United States and Canada: A Directory* (4th ed.), which was published in the same year. This new ALA *Guide* is still limited to the map libraries of the United States, but since the Canadians have their own well-established and regular *Directory of Canadian Map Collections* (5th ed., 1986), that restriction makes sense. All the other defects have been mended in this second edition, and several new features make it the most useful directory of its kind that I have seen.

... several new features make it the most useful directory of its kind ...

The basic arrangement (alphabetically by state, city, and then institu-

tion) remains the same as does the information about each collection (974 collections vs. 919 in the first edition). This information includes:

- Name and address
- Telephone, fax, and electronic mail numbers
- "Responsible person"
- Numbers of professional and non-professional employees, further divided into full- and part-time
- Area and subject strengths of the collection
- Size of collection, broken down into various categories of materials
- Chronological coverage
- Percentage of maps cataloged and classification method used
- Format of catalog
- Preservation methods employed
- Square footage devoted to collection
- Equipment used
- Publications
- Hours of service
- Public served
- Databases online
- Availability of circulation, interlibrary loan, and photocopying
- Statistics on the number of readers per month and annual map circulation

... [finding] mailing addresses and phone numbers for ... colleagues elsewhere ... becomes a one-step operation because of the "Names and Number Index" ...

[The arrangement] ... scheme creates a formidable dossier of information for the collections, and makes it possible to assess quite accurately the usefulness of a given collection for particular researches.

This scheme creates a formidable dossier of information for the collections, and makes it possible to assess quite accurately the usefulness of a given collection for particular researches. The whole process is made immeasurably easier by the typography in this second edition. It is eminently readable, with roman, italic, and two sizes of bold-face type for highlighting sections of the entries.

... the typography in this second edition ... is eminently readable, with roman, italic, and two sizes of bold-face type for highlighting sections of the entries.

I can imagine other uses for a reference book like this, but in my experience there are primarily two. I frequently get calls or letters from distant parts of the country inquiring about the availability of older maps of various areas. Sometimes, our holdings will be uniquely useful to the inquirer, but often, using this Guide, I have been able to quickly refer them to one or more map libraries in their immediate area which I can reasonably suppose will be able to provide the materials they require and of whose existence they were totally unaware. I must have used the *Guide* a dozen times this way in the few months I've had a review copy.

My other principal use of the *Guide* has been to find mailing addresses and phone numbers for my colleagues elsewhere. Typically, in directories like this, one finds the name of the librarian in a back-of-the-book index, then goes to the entry for the library in the body of the book for the address. In the *Guide*, however, this becomes a one-step operation because of the "Names and Number Index," a listing of all the personal names of staff included in the main entries, with full institutional mailing addresses, phone numbers, and electronic mail addresses when available. The serial number for the full institutional entry is given in parenthesis so one can easily access the full dossier if necessary. This is the last index in the book, probably because the publishers anticipated that it would be the most used.

Preceding it is a "Collections Strength Index," with over three thousand entries compared to the scant hundred in the first edition. Using the index one can quickly find the seven libraries in Maine that are depositories for USGS topo sheets, or the present home of the map collections assembled by Leopold von Ranke or Erwin Raisz, or the six libraries that claim a special interest in maps of Japan. The "Collection Strength Index" is also subdivided by the state in which the collection is located, so that if our hypothetical patron interested in maps of Japan lived in the southeast, our attention would be immediately drawn to the Alabama collection indicated under

... [T]he Map and Geography Round Table has clearly mastered the technical and financial hurdles presented by a reference book of this sort.

... there is every reason to believe that ALA MAGERT will ... produc[e] a revision "at least every five years."

that rubric. Three appendices list "Earth Science Information Centers," "State Information Resources" (i.e. producers and distributors of official state maps), and "State Mapping Advisory Committees."

I do not know whether or not the Geography and Map Division of SLA is working on a new edition of their *Directory*, which has served the cartographic community so well for over thirty years. But I remain convinced, as I wrote in 1986, that "personal energy and book dollars are too limited to continually justify supporting two such similar products." With this second edition, published only five years after the first, and produced by a team of regional editors (all thirty-two named on the title page), the Map and Geography Round Table has clearly mastered the technical and financial hurdles presented by a reference book of this sort. With a computerized data base on which to build, there is every reason to believe that ALA MAGERT will fulfill its goal, stated in the introduction, of producing a revision "at least every five years." All map collections, and indeed all libraries with an active general reference desk, should have a copy of this *Guide*.

Robert W. Karrow, Jr.
The Newberry Library
Chicago, Illinois

"The Electronic Map Library"

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The cordiform, or heart-shaped, projection was the invention of Johannes Stabius, published first by Johannes Werner in 1514. While some are modifications of Ptolemy's second projection, the heart-shaped form is most recognizable in the Bonne Projection. The origins of and context for these projections are discussed by J. Keuning (*Imago Mundi* 12:1–24) and G. Kish (*Imago Mundi* 19:13–21). The single cordiform was expanded by Oronce Finé to a double cordiform in 1531; this was copied by Mercator, the first world map which he produced, in 1538.

The U.S. Postal Service released on 9 May a "Love" stamp on which the heart-shaped projection was loosely developed and artistically compiled. Designed by Harry Zelenko of New York, the 29-cent stamp is printed in four colors and is available in sheet and booklet formats.

IBM presents ...

"The Shape of the World"

Granada Television International
in association with Thirteen/WNET New York

and

The Shape of the World

Simon Berthon and Andrew Robinson
Chicago: Rand McNally, 1991. 192 pp.
ISBN: 0-528-83419-3. $39.95

A commentary by George F. McCleary, Jr. and Jenny Marie Johnson

There's a tremendous sense of adventure and bravery ... extraordinary individuals—people who conquered their fear of the unknown and set off on dramatic voyages of discovery ... people who felt an urgent need to know the world, to discover what was *out there*. Many faced terrible hardships, yet they persevered; they were not the kind of people who gave up easily.

As for the map-makers themselves, they were considered important weapons in a country's arsenal. The best of them were like the top-level scientists of today—they were great detectives, with tough, inquisitive and persistent minds.

With fanfare appropriate for a network miniseries, the Public Broadcasting System presented for six weeks in April and May "The Shape of the World." Accompanied by a book and instructional materials, the series is a graphic history of mapping and cartography; examining a wide range of cartographic topics, exploring some in depth, it is a propitious opportunity for a wide range of professions and disciplines.

A production of Granada Television International, in association with Thirteen/WNET New York, the series was underwritten by IBM. The British Library and the Royal Geographical Society served as consultants. In addition IBM funded the development and distribution of of science and social science study materials; these were prepared by TelEd, Inc. with the cooperation of advisory committees composed of scientists, geographers and classroom teachers. The goal for the series and the educational materials is to enhance the teaching of geography and to provide an introduction to the 500th anniversary in 1992 of Columbus's discovery of the New World.

It is easy to criticize "The Shape of the World" (videotapes, book and instructional materials). Things were omitted. At nearly every point, it is possible to cite a better, a more important, example. There are a number of errors in the "Chronology." Does the survey of India warrant a tenth of the book (and a similar proportion of the videotapes) without tying this to the many similar surveys carried out around the world? While the measurements of Eratosthenes are illustrated correctly in the teaching materials, they are not in the book.

Given the nature and extent of this undertaking, it is not surprising that there were shortcomings—no one should be amazed that criticisms arise with ease.

"Would it be possible to get through a day without using a map? I think not."

Concluding the first episode, Patrick Stewart uses this question to summarize a three-minute collage of cartographic images and map-use activities. Here, and throughout the series, the central role of Stewart, classical theater and television actor, cannot be ignored. His aural presence sets the tone and establishes the context for each vignette and example. He punctuates the historical narrative with commentaries; he juxtaposes, for example, the egocentric geographic perspective of Javanese natives with the abstract information-laden global view of television advertising.

The first episode focuses on the earliest ideas about the shape of the

earth, those inspired by imagination and religion. The viewer is guided carefully through the evolution of the *mappaemundi* which dominated the western world view for more than a millenium. Religion, power and sheer practical need promoted not only cosmological perspectives but also early Egyptian and Chinese mapping and the context and concepts provided by and embodied in Greek science. The first hour concludes with "Ptolemy's *Geography*, ... the engine of the Renaissance ... [casting] a blinding shaft of light on ideas about the world."

With "bribery, espionage, international power struggles, and the search for gold" as the focus, the second hour is devoted to the competition for control of the sea and trade routes and the worldwide exploration which resulted. Here come to life the forces which drove the Italian city-states, the Portuguese, the Arabs and the Chinese—as well as modern nations—for commercial supremacy. Concepts and technologies, such as magnetism, geomancy and the compass, are explicated. Individual cartographers come to life—Prince Henry the Navigator, Fra Mauro, Cantino and Cresques, all become the subjects of dramatizations explaining their roles in the evolution of the world map.

"A new continent is discovered and the shape of the world is changed once more."

With this statement Stewart introduces the episode dealing primarily with the exploration and

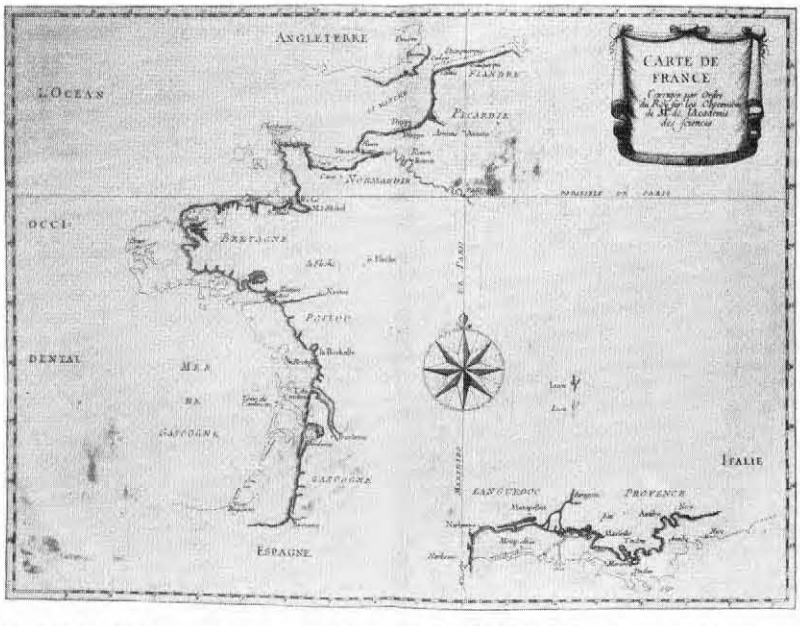
The pages in the instructor's manual pose questions (and provide answers).

What was "the white man's burden"? How is that philosophy inherent in apartheid? If your class contains students whose families' original homelands were colonized, ask them to report to the class on that country's colonial history. By whom was it colonized? When? When was independence declared? What were the effects of colonization on that country? Were any of the effects positive, and, if so, which? What reminders of their colonial history remain today?

The handout emphasizes that the British motive for mapping India was primarily a political one. What is the meaning of the sentence, "All geographic knowledge has military implications, under the right circumstances"?

Duplicate and distribute *Student Handout 24*, "Filling in the Blanks." Why do students think it might it be more difficult to map landmasses than it is to map coastlines? (The shapes of coastlines are essentially two-dimensional and they were originally measured from offshore, which is to say at sea level. Landmasses, unlike the sea, are irregular in elevation, making it difficult to map the relative height of mountains, valleys and other features.) **Why, then, do students think that the mapping of many landmasses begins at the coasts?**

Given the information on the handout, why are there so many straight-line borders? Why did Americans, given the task of establishing new cities in territories not previously mapped by Europeans, establish city grids characterized by straight lines and perpendiculars? Why are older Asian and European cities less likely to be laid out in such a geometrically regular fashion? (They grew "naturally," rather than in accord with grids laid down in advance by mapmakers, and were mapped later.)



Cassini map of France showing reduced size.

settlement of the Americas. Here, and in "Empire" (the fourth episode) which deals with the Great Triangulation Survey of India, are accomodated developments in cartography over a 400-year period. These are set against discussions of the geographic and cosmological perspectives of the native populations, fleeting references to Dutch (Ortelius) and English (Saxton) cartographers. Against these two "major events," couched in one case in an in-depth analysis of the Jamestown settlement and, in the other, in an extended examination of the survey of India, are arrayed discussions of, for example, the clock and longitude, "the final clue to the shape of the world,"

Standing in stark contrast to the first four hours, the last two focus on the advent and evolution of remote sensing platforms and sensors ... and the use of computer-supported cartographic systems.

Standing in stark contrast to the first four hours, the last two focus on the advent and evolution of remote sensing platforms and sensors (from balloons and cameras to satellites and radar) and the use of computer-supported cartographic systems. While, at the outset, it was the aerial perspective which was so useful in defining the shape of the world, other technological advances made it possible to map beneath the sea, the ice and the clouds, as well as in outer space. It thus became possible to inventory an extraordinary array of environmental attributes and, with the computer, to present this information to help organize spatial activities and to help people to gain an understanding of the environment.

The Shape of the World, is not requisite to understand the six-episode series, nor is the series necessary to understand the text.

"Our vision of the world, once partial and intimate, is now total and public. We have revealed the shape of the world—now we will determine the shape of its future." With this overstatement, Stewart launches the concluding discussion of the series, an examination of a wide range of environmental problems, of situations where mapping has enabled us to gain an understanding of heretofore inexplicable natural phenomena (El Niño) or where the results of the exploitive nature of human activity, encouraged by earlier cartographic programs, are now being subjected to map analysis (the Amazon Basin).

The Shape of the World should not be considered a scholarly tome for it has no footnotes and only a 56-item bibliography.

The Shape of the World

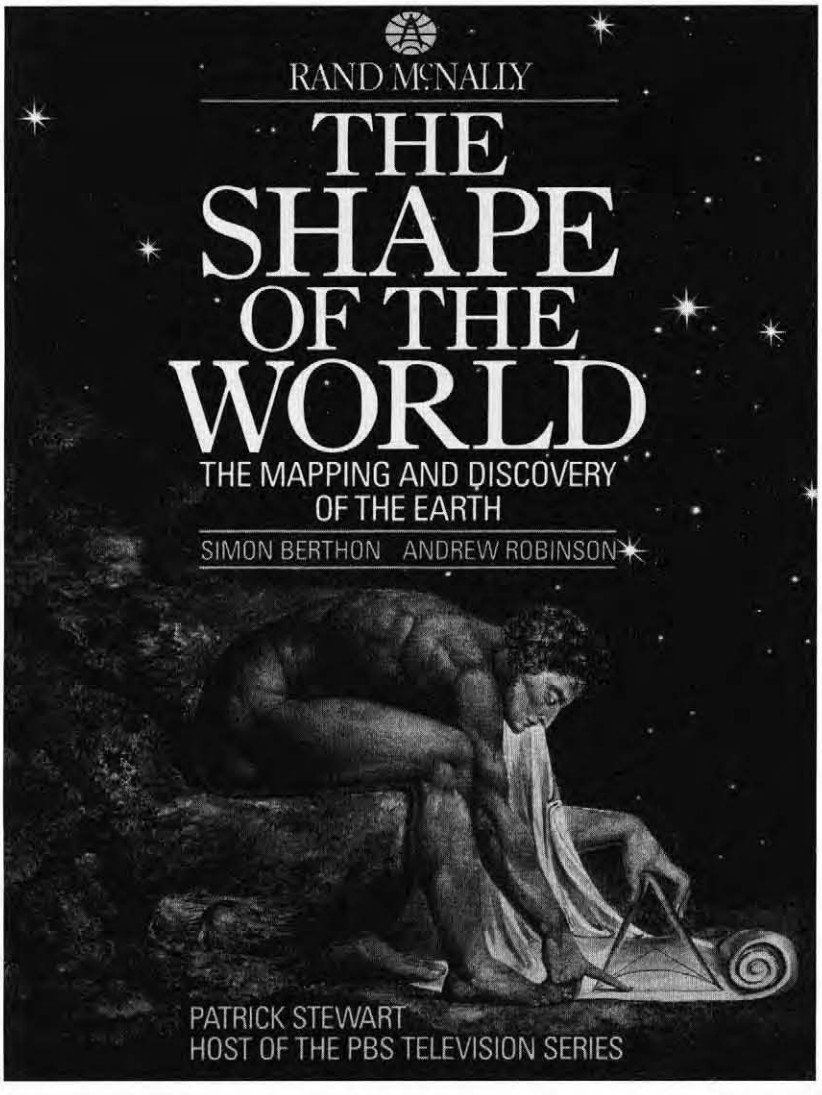
The 192-page text, *The Shape of the World*, is not requisite to understand the six-episode series, nor is the series necessary to understand the text. This lavishly illustrated volume enables viewers to re-examine, at their own pace, topics explored in the series without feeling as if they are reading a television script. Others may find their appetites whetted for either the series or for further information about the histories of geodesy, cartography, and exploration.

The Shape of the World should not be considered a scholarly tome for it has no footnotes and only a 56-item bibliography. Written by Simon Berthon (the deviser, writer and editor of the television series) and Andrew Robinson (formerly a publishing executive at Granada Television, who is also well-known for his writings on India), the volume is aimed at the interested lay person with prior knowledge of important events and figures in world history. The smoothly flowing text leads from the omphalic world views of ancient Egypt and Mesopotamia to today's global concerns with special attention being paid to a number of important periods and events: Ptolemy's work in map construction; the medieval world which gave rise to the mappae mundi; Portuguese, Genoese, and Venetian efforts to explore for the sake of economic gain; discovery of the "New World;" developments in navigational instruments and techniques; surveying India and exploring what would become the United States; and the use of remotely sensed images and geographic information systems to explore and document geographic phenomena. Each of the ten chapters is heavily illustrated with color photographs of landscapes, people, instruments, maps, and a wide variety of other geographically inclined illustrations. There are 151 in all.

The volume concludes with a chronology of events from 2000 B.C. to 1989 (including dates for exploration, settlement, map production, and technological advances), the aforementioned bibliography, and an index. The chronology is interesting because it makes transparent the increase in both knowledge and interest in the world which exploded late in the fifteenth century and continues to the present.

The Shape of the World is not written for use in research.

The Shape of the World is not written for use in research. No new ground is broken nor is the text sufficiently thorough or adequately documented. Instead, *The Shape of the World* brings historical personalities and events to life for many who perhaps have never thought about events leading up to Columbus sailing the ocean blue in 1492 or Lewis and Clark's expedition to the Pacific coast. People become real through the colorful descriptions of their efforts and the reactions of their contemporaries. Explorers, surveyors, and investors are no longer dry as dust; instead they are vibrant, human beings driven by jealousy, greed, curiosity, or desperation. Investors and surveyors make shrewd calculations; ship's companies go on drinking sprees; and scientists are met with skepticism. Maps are no longer simply useful graphic abstractions—they are integral elements in peoples' lives.



The illustrations put important historic documents from all over the world into the hands of the armchair explorer; the authors drew upon the great libraries of the world, including the Bibliotheque Nationale, the Bodleian Library, the British Museum, the United States National Archives, and the Newberry Library, places that most readers only dream of visiting. The illustrations certainly, not intended to be facsimiles, brighten the pages, explain visually things that the written word cannot, and make vital the differences and similarities in cultures and innovations.

There are no similar non-scholarly surveys of the history of cartography. John Noble Wilford's *The Mapmakers* (1981) lacks the beautiful illustrations of *The Shape of the World*, but it contains quite a bit more textual detail. Other titles, such as *Atlas of Columbus and the Great Discoveries*, *Antique Maps and Charts*, *The Cartography of North America*, 1500-1800, and *Sea Charts of the Early Explorers*, have beautiful illustrations but quite often cover only specific periods or types of materials or have very little text.

The Shape of the World is unique in its energetic and interesting presentation of the histories of geodesy, cartography, and world exploration. Well written text and glossy illustrations pull the lay reader into a

different view of world history and the advancement of Western civilization. As a stand alone text or hand-in-hand with the six part Granada Television series, *The Shape of the World* will introduce many for the first time, and re-acquaint others, to the beauty of maps and the mysteries they represent.

Student booklets contain informational papers as well as exercises and projects.

Teaching Materials

The text *The Shape of the World* does not exactly mirror the television series, but two teachers' manuals, one for science and one for social science, each 29 pages, have been developed to parallel topic presentation in the series. The six programs are introduced with a synopsis and a list of materials to be used; each program is accompanied by suggested discussion topics, projects and activities to be used both before viewing and after viewing the episode. The accompanying social studies student booklet contains 30 pages, the science 18. These are, predominantly, text and map handouts; the balance includes some activities (ten for science and eight for social science—six of these are the same).

It is hard to be other than excited about "The Shape of the World." Visually and aurally exciting, it is nicely "choreographed" and moves from time to time and topic to topic in interesting ways. While perhaps not so intriguing in terms of relationships as, for example, James Burke's "Connections," "The Shape of the World," nevertheless, makes familiar areas of human endeavor which have

PROGRAM ONE

STUDENT HANDOUT 4

THE SHAPE OF THE WORLD

Eratosthenes

Although both Aristotle (384-322 B.C.) and Archimedes (c. 287-212 B.C.) estimated the circumference of the earth, they left no description of their methods, and their estimates were inaccurate. Eratosthenes (c. 275-195 B.C.), a Greek mathematician who served as the librarian of the great ancient library and museum in Alexandria, Egypt, designed an elegant method to calculate the circumference of the earth.

The curious librarian heard travelers' reports that at Syene, situated close to the Tropic of Cancer, the sun shone directly down into a deep well on June 21. But at Alexandria, about 500 miles almost due north of Syene, the sun was not directly overhead at midday. Eratosthenes used a device like a sundial that consisted of a vertical rod, called a **gnomon**, so carefully constructed he could assume that, if extended, the rod would pass through the center of the earth. When the sundial indicated it was midday, he measured the shadow cast by the gnomon. With that measurement, he had measured the earth!

Eratosthenes then measured the gnomon's length. He now had two sides he could connect to complete a triangle, and enough information to calculate the small angle ABC (see Diagram 1). An elementary theorem in plane geometry establishes that when a transversal crosses parallel lines, the alternate interior angles are equal. Since for all practical purposes the sun's light arrives at the earth in parallel rays, he was able to determine the angular distance (at the center of the earth) between Syene and Alexandria — 7.2°.

He also knew the distance between Syene and Alexandria (about 500 miles). The circle contains 360°, so he simply divided 360 by 7.2, and learned that the 500 miles between the two cities was 1/50 of the 25,000-mile circumference of the earth.

You can experimentally verify Eratosthenes' calculation.

PURPOSE:
To estimate the circumference of the earth.

MATERIALS: (per group of students)
1. Globe
2. Protractor
4. Two small lumps of clay
5. Two small sticks about 10 cm long (coffee stirrers cut in half work nicely)
6. Flexible ruler (or a piece of string and a rigid ruler)
5. 3" x 5" card

PROCEDURE:
1. Attach two sticks to the globe with clay as shown in Diagram 2.
2. Point one stick directly at the sun so it does not cast a shadow. Use a protractor to measure the angle of the shadow cast by the other stick as shown in Diagram 3.
3. Measure the distance between the two sticks using a flexible rule or using a piece of string and rigid ruler.
4. Calculate the circumference of the globe using the following formula:
   $\frac{\text{distance around globe}}{\text{distance between sticks}} = \frac{360°}{m\angle a}$
   OR
   Distance around globe (circumference) = 360° x distance between sticks ÷ m∠a (angle created by joining a line from the top of the stick to the end of the shadow)
   OR
   D = (360° x d) ÷ m∠a
5. Wrap a string around the globe and measure it.

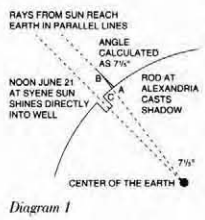


Diagram 1

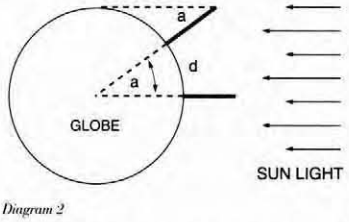


Diagram 2

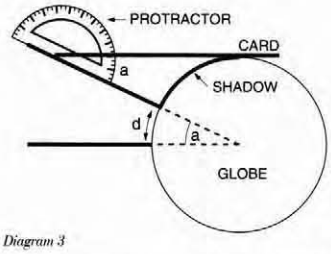


Diagram 3

1991 TelEd Inc.

Classroom materials funded by IBM

always been abstract and have become increasingly more complex.

It mixes historical anecdotes with modern assessments—ancient cartographers traverse modern settings, and modern navigators and surveyors assess old maps and charts. In a time frame which is, by any measure, extremely limited and which did not allow for detailed explanation (alright, call it shallow and superficial!), it is on the one hand descriptive and on the other provocative. Sometimes the presentation is quick; sometimes things are simplistic. But it is seldom unattractive and as a whole it is captivating.

If there is a major problem, it lies in the fact that often the map gets lost.

If there is a major problem, it lies in the fact that often the map gets lost. We never see the creation and development of a map from start to finish (except for the extended discussion of *LA: THE MOVIE).* In the series as a whole, there are probably too few maps—but it is hard to study a map on the screen. Maps do things, and the series makes that obvious. It shows map users and map creators—it shows the interrelationship of maps and mapping to other sciences and activities.

How many people will go to the library, will become more interested in mapping and cartography, or will do something because of this series? How useful will it really be? Only time will tell.

How can people in "the map business" make it useful? For the educator, there is a wealth of material. (Over 100,000 teachers received the science and social science materials provided by IBM.) One can visualize a one- or two-hour weekly seminar using the video as a catalyst, tying the ideas to either a course in the history of science, technology, exploration or cartography. Here map librarians might integrate their talents with those of historians or geographers, adding to or supplementing the curriculum with a meaningful exchange of ideas.

At the opposite extreme, the historian of cartography can explore "The Shape of the World" to gain insights into packaging—into the marketing of information and ideas which have been handled altogether too often in formidable ways. What is there here, in both content and presentation, which we can learn and apply to the presentation of maps and cartography to a wider audience? There are very large gaps among the different constituencies in "the map business." These gaps are most noticeable between the academic cartographer and the layman.

Most exciting is the possibility that "The Shape of the World" might serve as a catalyst, suggesting a more important (or, at the minimum, some) contribution of maps and other graphics in courses on western civilization and intellectual history. Is it possible that "graphicacy" might become "the fourth ace in the pack" (Balchin and Coleman, 1966), and that cartography will be recognized as a contribution to liberal education (Robinson, 1965)?

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Can You Tell Me Where, In the Middle East, ... ?

Alice Hudson
The Map Division of The New York Public Library

... the terms Middle East, Arab World, Near East, and Islamic World are not interchangeable or identical in meaning.

... few atlases of the *region* have been produced. Perhaps this reflects a certain amount of lack of interest ... or a result of just the prickly issue of trying to *define* the region.

Located in *the* national media center, The New York Public Library (NYPL) serves as a resource center not only for individuals but also for the television networks, newspapers and news magazines. The maps and atlases housed in the Map Division are often used to help interpret extraordinary news events. Map Division staff hope that the information provided to the media clarifies and improves the accuracy of the news seen on television screens and in newspapers, thereby contributing to an informed citizenry.

Military activities have generated reference requests to The New York Public Library since World War I. While the War Department used NYPL resources for planning the African campaigns during World War II, the media—and their families and friends—as well as veterans, have used Map Division resources for tasks ranging from place name verification to research for journal articles and novels. Similarly, the current "Middle East crisis" has produced a continuous flow of requests for maps of Baghdad, Kuwait City, Iraq, and Jordan. Aeronautical charts, topographic maps, oil and gas pipeline maps, general road maps, and city plans are all sought by parties of diverse interests.

One observation made readily apparent by reviewing the Map Division holdings is that the terms Middle East, Arab World, Near East, and Islamic World are not interchangeable or identical in meaning. Each differs from the others not only in terms of geographical location and extent, but in historical origins and connotations as well. For example, "Middle East" is a pejorative term to some; derived from a measurement of the world in distance from the shores of Britannia, it implies that the area is lacking in value in its own right.

Another observation is that so few atlases of the *region* have been produced. For those atlases which do exist, follow-up editions do not. Perhaps this reflects a certain amount of lack of interest by the "Western" world, or a sacrifice of a consensual regionalism to the nationalism of individual "Eastern" states, or a result of just the prickly issue of trying to *define* the region. In any case, meager holdings are but a pale reflection of the tragedy we now view on the evening news.

Following is a brief list of some of the regional and national atlases that provide a good cartographic overview, from a variety of perspectives, of the present situation in the Middle East. These materials are available for reference use in the Map Division (and in map collections elsewhere). In addition to these atlases, a special folder has been set aside in the reading room, which contains nautical, aeronautical, and topographic maps, and individual country maps for the Gulf region, Iraq, Kuwait, Jordan and Saudi Arabia. Important city plans, such as those for Amman, Baghdad, Kuwait City, Riyadh, and Tel Aviv, are also

included in the folder. Although no national atlas for Kuwait has been found, detailed maps of this country are available for reference use.

Atlas of the Arab World (NY: Facts on File 1983).

Similar in style and brash presentation to the *State of the World Atlas*, this exciting atlas has regional maps from Mauritania to Oman, excluding Iran. Covered topics include literacy and learning, the media, wealth of the Arab world, and military might.

Individual plates include one of "Iraqui tribes" and a map of Baghdad divided up into seventy-six named "quarters" or neighborhoods.

Atlas of Iraq, by Ahmed Sousa (Baghdad: Surveys Press 1953).

One of two national atlases on this list, this atlas coyly colors the Neutral Zone in the same tone as the province of Al-Badiya al Janubiya. Kuwait is never "claimed" via this technique in this most recent separate atlas for Iraq. Interesting individual plates include one of "Iraqui tribes" and a map of Baghdad divided up into seventy-six named "quarters" or neighborhoods.

An Historical Geography of the Ottoman Empire from Earliest Times to the End of the Sixteenth Century, by Donald Pitcher (Leiden: Brill 1972/1973).

The map section, a small historical atlas, both stands well on its own and supplements the text nicely.

... after Kuwait became independent and weak, but rich with oil royalties, ... various neighbors, including Iraq, were "quietly awaiting their chance to move in."

Atlas of the Arab World and the Middle East (Amsterdam: Djambata 1960).

Probably produced for use in schools in the Middle East, this atlas focuses on regional political and historical issues, as well as providing basic geographical information.

Atlas of Israel (Tel Aviv: Survey of Israel and NY: Macmillan 1985).

This beautifully produced large national atlas is loaded with geographical, historical, political, and statistical information.

Atlas of the Middle East ed. by Moshe Brawer, Tel Aviv University (NY: Macmillan 1988).

From Libya on the west, Sudan on the south, Turkey on the north, and Iran on the east—this atlas provides current thematic maps of the region, and for individual countries.

Atlas of the Middle East (Dubuque: Kendall/Hunt Publishing Co. 1975).

Apparently designed to support classroom lectures in regional geography, this unexciting atlas nevertheless adds to the information available. Topical maps of the entire region focus on history and politics, demography and social characteristics, and economic conditions.

An Atlas of Middle Eastern Affairs (NY Praeger 1963).

While small (about the size of a paperback), this little atlas contains informative text and maps. Writing about Kuwait, the author describes the British involvement in the area in 1899, when they sought to control a planned trade route (a railroad from Central Europe to Baghdad). Years later, after Kuwait became independent and weak, but rich with oil royalties, the author states that various neighbors, including Iraq, were "quietly awaiting their chance to move in."

Atlas of Saudi Arabia, by Hussein Hamza Bindagji (Oxford: Oxford University Press 1978).

This atlas claims the Neutral Zone via color for Saudi Arabia, much as the Iraq atlas of 1953 does. This atlas suggests that the Neutral Zone is part of the Northern Frontier province of Saudi Arabia. Filled with general topical maps and individual maps for the provinces, this atlas has excellent detailed maps of holy sites and major cities, such as Mecca and Mina, Riyadh, Jeddah, Medina, and Dammam.

The Cambridge Atlas of the Middle East & North Africa (Cambridge Eng: Cambridge University Press 1987).

Produced by three geographers based at the University of Durham in

England (Gerald Henry Blake, John C. Dewdney and Jonathan Mitchell), this atlas stresses the physical environment, cultural data, demography, economic information, and communications. All the maps are regional, covering the area from Morocco to Iran. There are few individual country maps, except those for Palestine and Israel, Lebanon, and Cyprus.

It is a beautiful work, whose calligraphy, artful shading, and tones draw one into the maps ...

Historical Atlas of the Muslim Peoples (Cambridge: Harvard University Press 1957).

This atlas is the "fruit of a collaboration between Western and Muslim scholars" and the Dutch cartographic firm Djambatan of Amsterdam. It is a beautiful work, whose calligraphy, artful shading, and tones draw one into the maps, illustrating a history we in the West have largely ignored.

Tübinger Atlas des Vorderen Orients (Wiesbaden: Dr. Ludwig Reichart Verlag 1977-).

The *Tübinger Atlas* for the Middle East (TAVO) is a thematic treatment of the region, produced on consistent scale maps for both current (Teil A) and historical geography (Teil B). Topics covered in Teil A include relief, geology, geomorphology, climate, hydrology, vegetation and "natural regionalization," dealing with "natural potential" and physiographic conditions of the Near and Middle East. Maps in Teil B are arranged chronologically, covering such topics as early settlement and environmental conditions, Hellenistic and Roman influences, the spread of Islam, the Crusades through the rise and fall of the Ottoman Empire, and political reorganization after World War I.

It strikes me funny that the historical era is defined by European and twentieth century influences, ignoring some 10,000 years of history.

Published in a series of loose map sheets, the atlas files neatly into map drawers. Sample sheet titles include seismotectonics and historical earthquakes, geomorphology, hydrogeography, natural vegetation, population distribution, population mobility, languages and dialect groups, Nomad tent types (my favorite), land utilization, roads and railways, foreign trade, venomous snakes (another favorite), and scorpions (yet again, *another* favorite ... oh, it is so hard to choose).

The atlas is supplemented by a series of monographs, entitled *Beihefte zum Tübinger Atlas des Vorderen Orients.*

Issues in the Middle East: Atlas (Washington: Central Intelligence Agency 1973).

Thematic maps in this atlas cover a variety of topics. Interestingly, the first map, "European Imperialism," occurs in the chapter entitled "Historical Perspective." It strikes me funny that the historical era is defined by European and twentieth century influences, ignoring some 10,000 years of history. Either somebody at the CIA has a sense of humor, or political correctness has gone to my head. Other thematic maps include: ethnolinguistic groups, dominant life styles, major religions and religious centers, population density, major cultivated areas, fresh groundwater resources, ecologists' concept of natural vegetation patterns before interference by man, present day natural vegetation, airways, physical-political map, oilfields and pipelines, earthquakes, desert locusts, Israel and Palestine, UNWRA camps (Palestine refugee camps), Israeli occupied territories as of 1973, Jerusalem and vicinity, Cyprus land utilization and ethnic distribution, Persian Gulf political boundaries, and the straits in the Middle East.

The preface to *Issues in the Middle East: Atlas* states the situation, both for the atlas and for the problem as a whole, very well: "The Middle East is torn by tension and bitterness. Hostility among ethnic, religious, and traditional groups constantly threatens, and at times erupts into, open warfare; rivalries among outside powers with political, economic and strategic interests in the area pose the possibility of wider conflict ..."

The Final Word

Jenny Marie Johnson

What can cartographic information specialists do to continue this quest, to encourage the continued use of maps, aerial photographs, or atlases?

Now is the time to begin making current technology such as digital spatial information and geographic information systems readily available.

By forming links with developers early in the formulation of new products and by generous sharing of information and experiences, librarians will begin easing the strain of living with materials produced in both the paper and electronic worlds.

Librarians shouldn't have to do the actual programming, but we need some input as to what it is and how it works. We need the opportunity to critique, correct, and assist in designing interfaces and documentation.

In the past nine months maps, too often ignored or accepted passively, have exploded onto the scene as highly desirable communication tools. Throughout the broadcasts from the Middle East, maps kept viewers oriented and interested. News anchors interacted with maps by pointing to them, using them as backdrops, and even walking on them!

Locally, maps of the Middle East were stocked by stores which normally did not carry maps, and newspapers ran articles describing the "best" maps and where to obtain them. Map dealers were caught "flat-footed" because of the upsurge of public interest in cartographic information. Map collections were called upon to fill specific Middle East information needs by the military, the public, and the academic community. For a short time, the masses searched to gain a knowledge of places far away. What can cartographic information specialists do to continue this quest, to encourage the continued use of maps, aerial photographs, or atlases?

Cartography must be brought to the attention of as many as possible; it must be made interesting and affordable. "The Shape of the World" is a fine example of distilling the essence of cartographic history, packaging it with a variety of important images in a format readily available to the masses, bringing important cartographic works into the viewers' and readers' living rooms. It seems to be a major step in popularizing the study of maps and the history of cartography. Similarly, *Blaeu's Grand Atlas of the Seventeenth Century World* brings a priceless work into living rooms and libraries. Yet it is not enough to bring these ancient images of the world into the light of today's reading lamp. Now is the time to begin making current technology such as digital spatial information and geographic information systems readily available. This may place cartographic information specialists in the unenviable position of being the "interface" between a variety of formats and their patrons. Users of cartographic information services often have little prior experience with spatial data in any format and may need prompting to express their query in a form which can be answered using maps or they may need assistance either in interpreting data or ascertaining whether or not the data answer their questions. Map librarians are already filling this function when assisting collection patrons with paper cartographic products. But what will be the interface between the librarians and software or digital data?

As greater amounts of information are distributed in digital format, information professionals are beginning to update their bases of knowledge at the exact moment that the public is demanding access to and support for these products. "Maps for the masses" is not an easy proposition. For librarians, this kind of endeavor means being comfortable with many formats. Beyond trying to find time to become familiar with new products and formats, librarians are networking with other librarians and professionals involved in developing systems which provide metadata, and systems or software that manipulate data including geographic information systems. By forming links with developers early in the formulation of new products and by generous sharing of information and experiences, librarians will begin easing the strain of living with materials produced in both the paper and electronic worlds.