Application-Based Graduate Course Encourages New Preservation Research

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Abstract:

Students in the Graduate Program in Historic Preservation at the University of Pennsylvania have used GIS in a diverse range of research projects since 2000. Software training generally was provided by the planning department. This presentation will describe a new graduate-level application-based course for students who have research interests in preservation planning, architectural conservation, landscape preservation, history, and historical archaeology. Lectures, tutorials, case studies, and individual projects combine to give students new spatial and analytical skills to apply to their own research. The course was designed to focus on the applications, with software training as needed. The response was overwhelming with 35 attempted registrations for a 25-student limit. Successes and opportunities experienced with such a broad range of GIS skill levels and research interests will be discussed as will the exciting new research opportunities that have emerged.

Paper Body:

Historic preservation addresses change responsive to the historic environment. The Graduate Program in Historic Preservation at the University of Pennsylvania is one of the top graduate preservation programs in the United States. Our 2-year program provides an integrated approach to preservation and includes architects, landscape architects, planners, historians, archaeologists, engineers, conservators, managers, and other professionals.

Students in our program began to use GIS in 2000, when a few students took a course in the Planning Department taught by Dana Tomlin, one of the early GIS pioneers. In 2001, Dana and our department chair, Frank Matero, conducted a joint preservation and landscape architecture seminar to map and prepare a condition survey of the above ground tombs of the St. Louis Cemetery No. 1 in New Orleans. The GIS mapping and later conservation work from this project, funded by the State of Louisana, University of Pennsylvania, Save our Cemeteries, the New Orleans Archdiocese and Save America's Treasures, has been the topic of many papers and presentations. It also was a multi-year project, offering graduate students the opportunity to learn and work with GIS. Each year more and more students took the courses taught by the planning department and more theses projects utilized GIS. A couple of the theses in recent years include:

Middlebrook, S. "GIS As a Tool to Assess Heritage Risk: A Case Study in Frijoles Canyon, Bandelier National Monument".

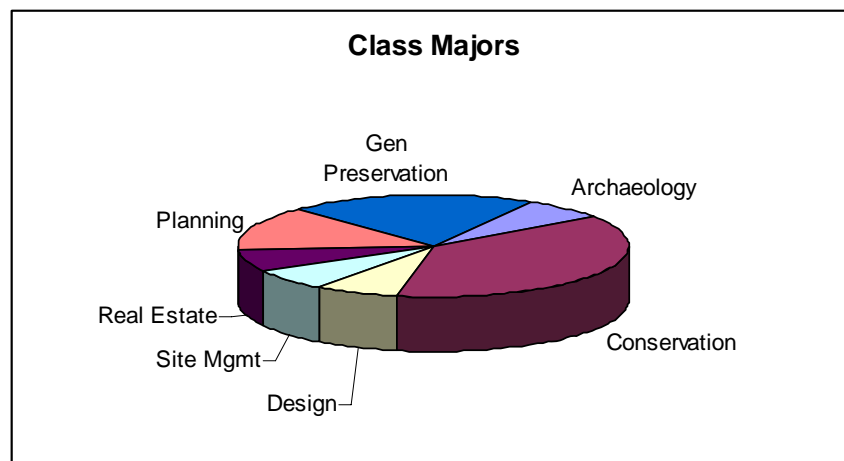Hegarty, L. "Saving Our Grace: A Regional Study of Sacred Places in West Philadelphia".

Borge, Claudia Cancino. "Assessment of Grouting Methods for Cracks and Large Scale-Detachment Repair at Casa Grande Ruins National Monument".

Fukushima, A. "Cultural Resource Management and Interpretation with GIS : a Pilot Project for the Independence National Historical Park, Philadelphia, PA".

Preservation projects rely heavily on data collection, and on the ability to visually present the results. To maximize the large quantity of information that is generated from any well-documented site or project, knowledgeable selection, application and linkage of digital technology tools are critical skills that professionals in the field now find necessary to have. As our program began to rely more and more on the few 'techy students' who knew how to use computers and software for everything from CAD to Photoshop to Database Design to Powerpoint, we added a new required course called Digital Media for all incoming students to introduce more of them to these basic software packages. I co-taught that weekly course and was able to use one of the sessions to introduce all students to GIS. For those that were interested, we recommended that they take courses in the planning department. However, we often received feedback that they had trouble seeing how to use GIS for their research interests based on what they learned in outside classes that were focused more on environmental sciences and planning.

Last year, we decided we would experiment and offer our own course targeted to how people in preservation, archaeology and history use GIS in preservation planning, condition and resource surveys, conservation and historical research. Our objective was to offer a course heavy on application examples and case studies, designed for students with specific research interests. But we would also offer software training at a level such that students without GIS training would be welcome. We hoped that there would be enough interest, as there is a requirement in our School that all courses must have at least 10 students registered. I was out of the country during the announcement and registration for the class, so was not able to be on campus to 'market' the course. I was preparing myself for disappointment. I got back just before Christmas and got the phone call from the department that the class was completely overbooked with 35 students! Our graduate level courses only allow 25, so a wait list had been started. The news was good - The class was definitely a 'go'.

Once the semester started, some of the wait list decided to wait until next year, or to take other classes and then we gave special permission for 4 more students. The class ended up being very full with 27 preservation students and 2 PhD Archaeology students, all coming in with different research interests and at different levels of computer and software skill levels. In the opening class questionnaire, when asked how much GIS experience they had, most had only been exposed to GIS in the Digital Media class and the strong feedback given was to start from the basics. Their long list of research interests became a guideline for me to track down more specific readings and tutorial materials.

Class Majors

The syllabus schedule below shows how the course was presented.

Week 1 **January 13, 2006**	**Introduction to GIS in Historic Preservation** Introductions, Course review, introduction to applications.
Week 2 **January 20, 2006**	**ArcMap Basics 1 – Interface, Making Maps, Output** *Case Studies:* Documentation of Cultural Resources
Week 3 **January 27, 2006**	**ArcMap Basics Continued – Displaying Data, Features** *Case Studies:* Preservation Planning with GIS, NPS *Assignment 1 Due:* Create Basic Map in ArcGIS
Week 4 **February 3, 2006**	**Building a GIS – Database Principles, Geodatabases, GIS Project Databases** *Case Studies:* Condition Surveys for Conservation *Assignment 2 Due:* Create Basic Layout of Historic District
Week 5 **February 10, 2006**	**Analyzing Data and Relationships, Queries** *Case Studies:* New Findings through GIS, Conservation and Archaeological Case Studies
Week 6 **February 17, 2006**	**Cartography and Map Design, Imagery, Data Sources** *Case Studies:* Boston Through Time, D. Rumsey Tools *Assignment 3 Due:* Condition Data Analysis
Week 7 **February 24, 2006**	**Coordinate Systems & Projections, Table Manipulation** *Case Studies:* Historic GIS - Salem Witch Trials, Valley of the Shadow, New Dust Bowl Theories *Assignment 4 Due:* Census Data Analysis
Week 8 **March 3, 2006**	**Creating and Editing Data, Metadata, CAD Sources** *Case Studies:* Historic Landscape Analyses, Battlefields. *Assignment 5 Due:* Mapping Philadelphia Sites
Week 9, March 4	**No Class - Spring Break**
Week 10 **March 17, 2006**	**Mapping Time, Advanced Editing Concepts, Geocoding** *Case Studies:* Historic Cemetery Research, New Lessons from Historic Maps and Documents, Salem Witch Trial *Assignment 6 Due:* Historic Philadelphia Map Manipulation *Assignment 7 Due:* Personal Project Abstract & Map List
Week 11 **March 24, 2006**	**Spatial Data Processing** *Case Studies:* Trail of Tears, Route 66, Lewis & Clark. *Assignment 8 Due:* Develop map from DOQ or an historical account.
Week 12 **March 31, 2006**	**Spatial Analysis** *Case Studies:* Country Historic GIS, China, Canada, UK
Week 13 **April 7, 2006**	**Spatial Analysis Continued** *Case Studies:* Cultural Site Management with GIS
Week 14 **April 14, 2006**	**Modeling – Diagramming Solutions for Spatial Analsyes** *Case Studies:* The Enterprise Solutions, Making Preservation 'Fit'
Week 15 **April 21, 2006**	**Final Project Class Presentations** Poster, Wall Map or Multi-Media Presentations

The course design mixed lecture, case study examples and tutorials covering fundamental GIS software skills, basic GIS uses already common in preservation, and more advanced skills that

are suggested for use in preservation research and data analyses. Most of the skills that would be necessary for their final project were planned before the spring break, with more advanced and analytical topics making up the second half of the course. Each week there was a 3-hour class, held in a room set up for wireless network connections to the school software. The first hour was dedicated to lecture, then about ½ hour on case studies and readings. After a break, the last hour involved a hands-on tutorial and most students brought their laptops to work through the examples as I demonstrated them on a digital monitor. The plan had been to have students work from the school computer center licenses, supplemented by additional licenses held by our department. But I quickly took advantage of ESRI's generous offer to provide 1-year licenses for students and was able to get software for everyone. I am sure that students spent much more time with the software by having it available on their own laptops. There was no required textbook, although both the ESRI *Getting to Know GIS* and the new Gorr/Kurland *GIS Tutorial – Workbook for ArcView 9* were suggested, and I found myself constantly using the older book by Maribeth Price, *Mastering ArcGIS.*

The course design included 7 assignments plus a final project abstract. The projects started out simple. The introductory task was to find maps from ESRI MapBooks as idea starters for conservation, planning, interpretation and historical research. Then they made their first maps of where they lived globally, nationally, regionally, and locally. Later assignments combined their new cartographic skills with Symbology mapping to create to complex maps using data from condition surveys with manipulated historic maps.

Their final project was based on their choice. They were asked to choose a topic where they had data available. They were required to state the main research question, or hypothesis, describe the methodology used to analyze the problem, present maps of the results, findings, and conclusions and make an assessment of the next level of work required. They were allowed to work in groups as large as 3, depending upon the complexity of the research. It was very hard to grade the students, as you'll soon see; they all worked hard on very innovative projects.

The most difficult problem with the course was time. The students really enjoyed working with the software and spent many hours each week. I live a couple of hours from campus and was only on campus each Friday. I did not have a teaching assistant and I found that having 29 'new best friends' for daily email conversations was very hard to keep up with. The dilemma I dealt with throughout the course was that on one hand the students were just learning how to work the GIS, had limited experience with database software or statistics, and continued to have trouble with software, network and data source glitches. Yet they each had very big, complicated research interests that required a much more advanced knowledge of these tools than they could acquire in a 1-semester course. If the class had been about software training, the pressure would not have been so great. Some of the students were in the final semester of their second year and had decided to incorporate GIS into their thesis, so had the extra pressure of needing to learn enough quickly to make it useful for their analysis. I was experienced in GIS, particularly in the tools that I've needed for my own research and projects, but I found myself on a very steep learning curve each week adding basic skills where I was not strong. I got through it, but I have a very full self-driven training program I want to accomplish before I teach this again next spring!

The key areas that need more work or will change for next year are the following:

- Introduce cartography theory and tutorials earlier.

- Spend more time on database theory.
    - Tricks to cleaning data, working between Excel, Access and ArcGIS
    - Need a very specific MS Access tutorial with preservation example
- Coordinate systems, Projects – Need to make this 'problem' understood much earlier. To many, they missed the point until it almost destroyed their projects.
- AutoCAD – This is fundamental to most preservation projects and we had constant problems trying to work between ArcGIS and CAD. Coordinate systems, drawing rules, formatting of layers, calculations, CAD prejudice against GIS, etc. all need work.
- Census Research – need better instructions on how to get useful data, how to use it. For those interested in this area, they need a dedicated tutorial.
- Mapping X,Y coordinates from GPS units, Total Stations, Needs a tutorial.
- Need a primer on statistics for any of the advanced analysis tools.
- For the design students that want to play with 3D, need to develop a tutorial and perhaps get student copies of Sketchup.

I can only show a few interesting examples of the project work from this class (starred and available in the Powerpoint presentation), but for those interested, here is the entire list of the projects presented:

Philadelphia House Museums – Interpretation Themes, Visitation, Demographics
Breweries History in Philadelphia
* Mapping Foodways on the Easter Pequot Reservation
* Expansion Analysis between Seattle Washington and Los Angeles California
GIS Analysis to Support *A City Transformed, Lancaster PA 1940-1980*
* Documenting Changes through Time, Current Development Threats at Tiwanaku Bolivia
Mapping and Analysis of Elfreth's Alley Census Data for Future Interpretive Research
* Campaigns and Conditions: Wall Paintings in the Rosario Chapel, Iglesia San Jose
Mapping termites as potential risk towards historic structures
Models for Condition Assessment of Masonry Wall at Eastern State Penitentiary
Interpreting the Building Chronology of Woodlands Framing Plan
Settlement Patterns and Population Demographics in the West
* GIS Possibilities in Monument Mapping
Comparison of the Gordion Turkey Site Related Sites, Local Environment
Potential Utility of the Jacob Reed's Sons Building through Economic, Political and Social Factors – A Real Estate Development Assessment
Campus Planning through GIS, Penn Campus

∗ Documenting Changes through Time of the Beijing China Cityscape
Analyze the Pattern and Relationships of House Type and Age in Overbrook Farms
Philadelphia Liberian Community Resources and Foodways

Based on the class assessment and the many emails that the department and I have received, the class was very successful. It was certainly very rewarding to me, and I think to many of the students. They knew that they were the guinea pigs for this new course, but had a good time helping me see the best ways to teach it. I am really looking forward to this coming spring, where I can take it to the next level based on the many lessons learned. I am also excited that so many of the 'first year' students now plan to use GIS for their final thesis next year.

Acknowledgements:

Appendix A: Full Syllabus & Bibliography

Geographic Information Systems in Historic Preservation
HSPV 741:001, Special Problems Historic GIS
Fridays - 9:00 to 12:00, Meyerson B-13

Instructor: **Judy Peters**
          908-359-5820, pajap2@attglobal.net
          Office Hours TBD (Generally Friday afternoons)

Course Description:

Geographic Information Systems (GIS) have become an important tool in preservation planning and architectural conservation. First developed in the 1960s to document and model natural habitats, GIS are now widely used at all levels of government and private practice, in all disciplines of university research programs, and throughout the National Park System to map and model diverse attributes of the natural and built environments, as well as cultural and social change. The inclusion of these rich layers of past and present cultural resource information in a GIS provides new opportunities for information management, documentation, condition assessment surveys, spatial analyses and problem solving, historical research, and interpretation, including training, public outreach and presentation development.

This course is intended to give participants a comprehensive exposure to the theory and application of geographic information systems (GIS) in all aspects of the field of Historic Preservation. Through lectures and weekly applied case studies, students planning careers in conservation, planning, landscape preservation, site management and historical or archaeological research will learn how spatially enabled databases can be used to benefit their chosen fields.

Software demonstrations and tutorials with related homework assignments will provide the basic and more advanced GIS software learning experience with the latest version of ESRI ArcGIS. Team and individual projects will allow students to apply these tools to their own personal research interests. No previous experience with GIS is required, and basic software training will be provided for those totally new to the software. However, the focus of the course will be on the application of GIS to preservation, so students of all GIS skill levels can benefit from this course.

Required Texts and Software:

Weekly readings to support the case studies and lecture concepts will be provided in the course folders or held on Reserve at the Fine Arts Library. To complete the assignments, each student will need to have a personal copy of ArcGIS 9 or later, or use the PennDesign Computing Center license.

While not required, the following tutorial books by ESRI press provide extensive training material and also include a free 6-month license of the software.

Ormsby, Tim, et al. *Getting to Know ArcGIS*, ESRI Press: Redlands CA, 2004.

Gorr, Wilpen L., Kurland, Kristen, *GIS Tutorial – Workbook for ArcView 9*, ESRI Press: Redlands CA, 2005.

Also not required, but a highly recommended resource for preservation professionals is:

> Knowles, Anne Kelley, *Past Time, Past Place*, ESRI Press: Redlands CA, 2002.

Homework Assignments:

There are 8 homework assignments that will span many of the possible applications for GIS in preservation, as well as historical and archaeological research. Completion of the assignments will provide the basic skills to allow students to develop their own GIS for research and analysis of a particular field of interest for the final project. Class demonstrations and tutorials will support these assignments.

Final Project:

Each student will locate and acquire data pertaining to a topic of interest to develop a geographic information system through the use of concepts learned in the course. Projects may be selected from the specific challenges presented in the case studies, a local Philadelphia interest, analyses to support a working or proposed thesis, or any other preservation or historical research related topic of interest. If the topic is complex or requires extensive research and data gathering, a team of up to 3 students may work together on the final project. Grading will be based on demonstrated knowledge of the GIS concepts and on the level of spatial analyses and insights derived from the data.

Class Assignments and Projects

> Assignments (8)   5% each, 40%
>
> (These will be handed out and discussed in class and due as scheduled.)
>
> Final Project   45% (Presentation due 4/21/06, Final report due 5/5)
>
> Class Participation   15% (The best way to get the most out of the class!)

Grading: Grades will be based on the assignments, class participation and the final project. The individual lectures and assignments will cover a very broad set of applications for GIS in our field. So, grading will reward those most that try everything and demonstrate an understanding of how geographic information systems can be utilized in diverse ways to progress the field. Class attendance and completion of the exercises assigned is required, except for pre-excused absences due to personal or professional conflicts.

Office Hours: Judy Peters is associated with the Architectural Conservation Research Center in Duhring 051 (beneath Fisher Fine Arts Library) and is available to help students with the assignments and projects, or to provide advice on individual projects and theses on an as-needed basis. Set up appointments directly or through e-mail, as her schedule varies.

Schedule: Class meets Meyerson B13 on Friday from 9am to Noon

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Week 9, March 4 – 12	**No Class - Spring Break**
Week 10 **March 17, 2006**	**Mapping Time, Advanced Editing Concepts, Geocoding** *Case Studies:* Historic Cemetery Research, New Lessons from Historic Maps and Documents, Salem Witch Trial *Assignment 6 Due:* Historic Philadelphia Map Manipulation *Assignment 7 Due:* Personal Project Abstract & Map List
Week 11 **March 24, 2006**	**Spatial Data Processing** *Case Studies:* Trail of Tears, Route 66, Lewis & Clark. *Assignment 8 Due:* Choose One: Map Cemetery Site from State DOQs or Map Historic Event from Historical Accounts
Week 12 **March 31, 2006**	**Spatial Analysis** *Case Studies:* Country Historic GIS, China, Canada, UK
Week 13 **April 7, 2006**	**Spatial Analysis Continued** *Case Studies:* Cultural Site Management with GIS
Week 14 **April 14, 2006**	**Modeling – Diagramming Solutions for Spatial Analsyes** *Case Studies:* The Enterprise Solutions, Making Preservation 'Fit'
Week 15 **April 21, 2006**	**Final Project Class Presentations** Poster, Wall Map or Multi-Media Presentations

Bibliography

GIS Theory and Tutorials

Arctur, David, Zeiler. Michael, *Designing Geodatabases: Case Studies in GIS Data Modeling.* ESRI Press: Redlands CA, 2004.

*Gorr, Wilpen L., Kurland, Kristen. *GIS Tutorial – Workbook for ArcView 9*, ESRI Press: Redlands CA, 2005.

Kennedy, Heather, Editor. *Dictionary of GIS Terminology*, ESRI Press: Redlands CA, 2001. (Also available online at http://support.esri.com/gisdictionary)

Longley, Paul A. and Michael Batty, Editors, *Advanced Spatial Analysis: The CASA book of GIS*. ESRI Press: Redlands CA, 2003.

Mitchell, Andy, *The ESRI Guide to GIS Analysis, Vol. 2: Spatial Measurements & Statistics*, ESRI Press: Redlands CA, 2005.

*Ormsby, Tim, et al. *Getting to Know ArcGIS,* ESRI Press: Redlands CA, 2004.

Peuquet, Donna J. *Representations of Space and Time.* Guilford Press: New York, 2002.

Price, Maribeth, *Mastering ArcGIS*, McGraw Hill Higher Education: Boston, 2004.

*Tomlinson, Roger. *Thinking About GIS: Geographic Information System Planning for Managers.* ESRI Press: Redlands CA, 2003.

GIS Applications

Beveridge, Andrew A. "Postwar Development in New York and Los Angeles: Surprising Findings Using GIS Techniques," Presented at the Newberry Library conference *History and Geography: Assessing the role of geographical information in historical scholarship*, March 25-27, 2004.

Bol, Peter K., "Putting History in Geography: The Challenges in Creating a GIS for the History of China", Presented at the Newberry Library conference *History and Geography: Assessing the role of geographical information in historical scholarship*, March 25-27, 2004.

Brown, Ian W., "The New England Cemetery as a Cultural Landscape." *History from Things: Essays on Material Culture, eds.* Steven Lubar and W. David Kingery. Washington: Smithsonian, 1993.

Freelan, Stefan, "Developing a Quasi-Temporal GIS for Archival Map Data," Paper presented at the *2003 ESRI User Conference*.

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*Rumsey, David and Edith M. Punt, *Cartographica Extraordinaire: The Historical Map Transformed*, ESRI Press: Redlands CA, 2004.

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Whitley, Thomas G. and Lacey M. Hicks, "Using a Geographical Information System (GIS) Approach to Extract Potential Prehistoric and Historic Period Travel Corridors across a Portion of North Georgia" Paper presented at the *2001 ESRI User Conference*.

Wilson, Andrew, "Sydney Time Map: Integrating Historical Resources using GIS," *History and Computing*, Edinburgh University Press, 13(1) 2001, 45-68.

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Cartography, Historical Maps

*Brewer, Cynthia A. *Designing Better Maps*, ESRI Press: Redlands CA, 2005.

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Turnbull, David. *Maps are Territories: Science is an Atlas*. University of Chicago Press: Chicago, 1993.

Web Sites and Links of Interest

ESRI.com - The leader in GIS software maintains a site with many resources, application examples, best practices in cartography and links to outside suppliers of map data. The support pages are very good and also include links to scripts written by others that can be downloaded and used freely. http://www.esri.com/, http://support.esri.com/

ESRI User Conference Proceedings – Papers and abstracts on the presentations and workshops offered for the past few years. Includes Educators and Surveyors User Group proceedings in addition to the larger International User Group proceedings. The main library link has links to most of the important journals and outside conference proceedings in the field of GIS. http://campus.esri.com/library/

Learning GIS with ESRI – There are many Virtual Campus courses that are actually free. http://campus.esri.com/

ESRI ArcView 9.0, 3D Analyst and ArcGlobe, Spatial Analyst - Watch video demos
http://gis.esri.com/esriclips/clip.cfm?ClipID=299
http://www.esri.com/software/arcgis/extensions/3danalyst/about/demos.html
http://www.esri.com/software/arcgis/extensions/spatialanalyst/about/demos.html

Geography Network - A popular site for maps and geography links.
http://www.geographynetwork.com/

National Geographic.com - Full resource for maps and educational material.
http://www.nationalgeographic.com/maps/

USGS National Mapping Information - A good place to start for information on the United States. Check back often for progress reports and new resources developed for The National Map, a consistent framework for geographic knowledge needed by the Nation.
http://mapping.usgs.gov/

Google Map – The map search engine for everyone. Rapidly renders maps, find an address, get directions. http://maps.google.com/

Google Earth – A 3-D mapping application. Even more impressive than Google map. Needs a download/install. Visualize spatial information from the global to the neighborhood level with very rapid search and mapping capabilities. http://earth.google.com/

The David Rumsey Map Collection – David Rumsey is a noted map collector specializing in 18th and 19th century maps of the Americas, but also including many other rare maps from around the world. He is also well-known for his dedication to providing public access to his collection. His award-winning website is extraordinary and has over 10,000 maps available for view. He has implemented many new technologies to allow spatial comparisons of maps through time. http://www.davidrumsey.com/index.html

TerraServer, the free site - This Microsoft site contains high-resolution aerial photographs and topographic maps from USGS. These maps can be freely downloaded and used. http://terraserver-usa.com/default.aspx There is also a commercial site that contains a much larger and finer resolution collection of images. Available for 7 day to 1 year regular and 'pro' memberships at http://www.terraserver.com

GlobeXplorer Aerial Atlas - a commercial service that can deliver aerial images from National to House level views. http://viewers.globexplorer.com/prtViewer/2D3DViewer/Viewer.jsp

GIS at the National Park Service - The National Park Service has extensive GIS projects underway. Over 200 parks now use GIS for documentation, interpretation and analysis. The applications are unlimited. Lots of case studies mentioned http://www.nps.gov/gis/

New Jersey Spatial Data Clearinghouse - an example of the level of data that states are beginning to offer. Not all states have reached this level, but most states do have some level of GIS information available. https://njgin.state.nj.us/NJ_NJGINExplorer/index.jsp

Pennsylvania Spatial Data Access – Finally, here's all the data for Philadelphia. http://www.pasda.psu.edu/philacity/

New York State GIS Clearing House – another local state example of the wealth of local map data available wherever you have a project. http://www.nysgis.state.ny.us/

A Place in History: A Guide to Using GIS in Historical Research by Ian Gregory, AHDS, 2002 - An online manual on techniques, practices and ethics of using GIS for historical research. http://hds.essex.ac.uk/g2gp/gis/index.asp

Salem Witch Trials - A new way of teaching history through the use of linked original archival documents through a relational database and GIS. http://etext.virginia.edu/salem/witchcraft/home.html

Valley of the Shadow - Compares and contrasts 2 neighboring communities on different sides of the Civil War using primary maps and documents linked with GIS. http://valley.vcdh.virginia.edu/

[Lewis & Clark Expedition](http://www.davidrumsey.com/GIS/lewisclark.htm) - Historic maps very effectively used in a GIS application to present history and geography. From the David Rumsey Map Collection. http://www.davidrumsey.com/GIS/lewisclark.htm

[GIS Resourses on the Web](http://www.geo.ed.ac.uk/home/giswww.html) - A far-reaching list of sites and servers found to be of interest to the GIS community. It is maintained by Bruce M. Gittings and Anup Pradhan at the Department of Geography in the University of Edinburgh, in collaboration with the Association for Geographic Information. http://www.geo.ed.ac.uk/home/giswww.html

GIS for Civil War Battlefield Preservation - by Dr. William J. Drummond at Georgia Institute of Technology: http://www.civilwar.gatech.edu/

Potomac Corridor Historic Resources: Connecting Past and Present: A large project that pulls together many diverse sets of data on the central Appalachia region to aid both heritage tourism and cultural resource management. http://gis.esri.com/library/userconf/proc01/professional/papers/pap674/p674.htm

Washtenaw County, MI Historic Resources: An example of the many local government sites now showing historic resources through web-enabled GIS. http://gisweb.ewashtenaw.org/website/histweb/viewer/viewer.htm

City of Denton, Texas – An example of a local government site with different layers and imagery available as you zoom into the map. http://gisweb.cityofdenton.com/website/pavementsearchengine/viewer.ht

City of Groton, Connecticut - An example of a local government site with different layers and imagery available as you zoom into the map. Historic Districts are a defined layer that can be mapped and investigated. http://grotongis.town.groton.ct.us/

The Great Britain Historical GIS – This project aims to collect all boundary, census, and other spatially connected data from the late 1830s until the 1970s to create a major database of social, economic, and electoral statistics. http://www.port.ac.uk/research/gbhgis/, Also a more public oriented site is found at http://www.visionofbritain.org.uk/

China Historical GIS – Site maintained by Harvard University. "The CHGIS will establish a database of historical administration units for different periods in Chinese history and will also provide a base GIS platform for researchers to use for spatioan analysis, temporal statistical modeling and representation of selected historical units as digital maps." http://www.fas.harvard.edu/~chgis/

TimeMap Site – Tools for time-based interactive mapping. Open source consortium managed by University of Sydney in Australia. http://www.timemap.net/