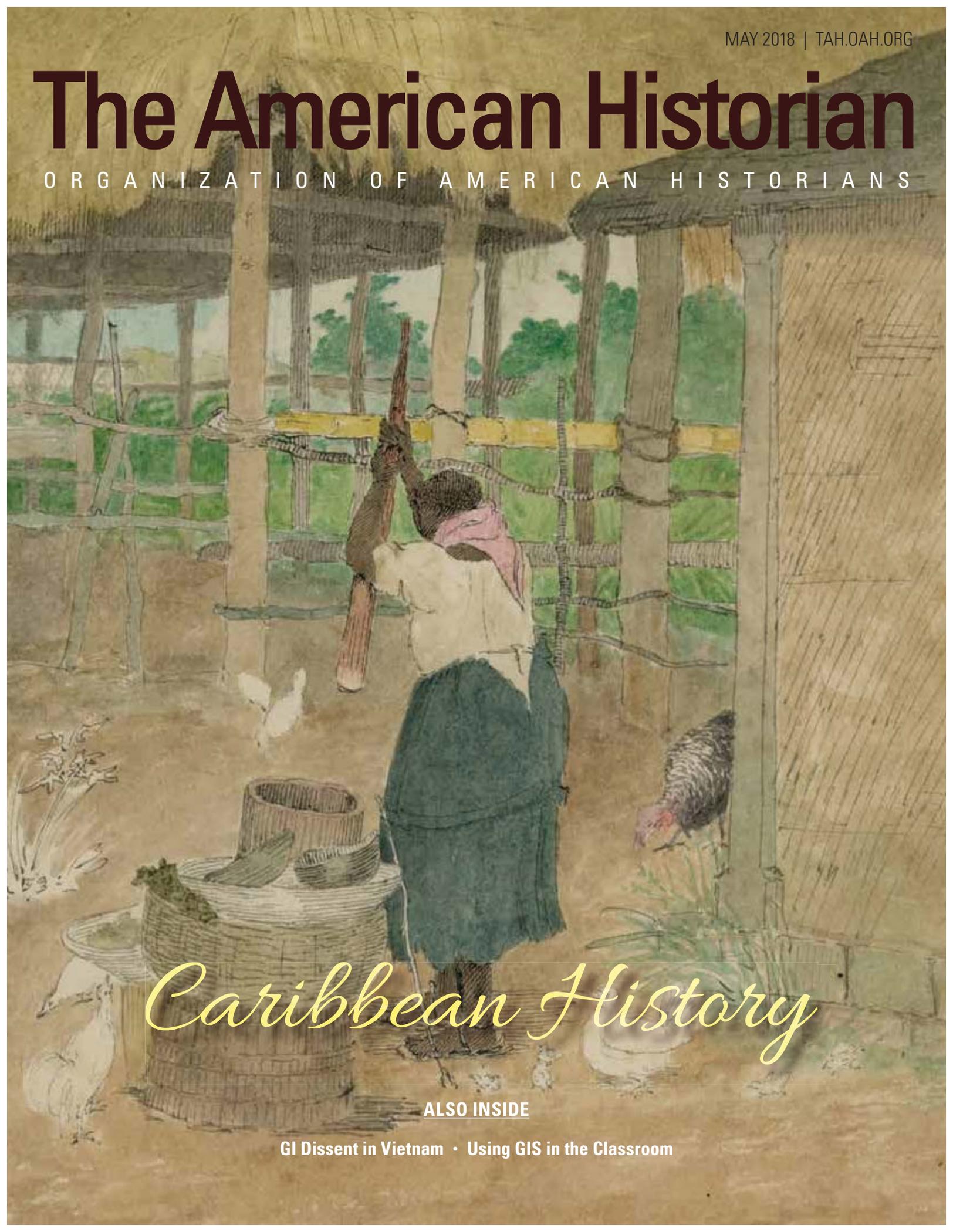


The American Historian

ORGANIZATION OF AMERICAN HISTORIANS



Caribbean History

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Using Geospatial Technologies to Explore the Layers of Our Past

Location-based technologies, such as Geographic Information Systems (GIS), are transforming how we interact with and understand our world. People around the globe regularly interact with these technologies to gather information and make decisions.

For the discipline of history, GIS allows the interactions of place, space, time, and scale to be more obvious to teachers and students. Often there is an over-emphasis on the chronology of historical events without a strong consideration for their connections to geography. GIS allows students to raise their critical ability to answer not only the important question of “where?” but also “why there?” While there will always be a place for primary sources and paper maps, ignoring the revolutionary power of GIS and how it can transform our discipline would cause us to miss an opportunity to improve our practice, build capacity, and introduce K-16 students with their past in an interactive, authentic, and transformative manner.

My goal is to provide a primer on historical GIS by answering some of the frequently asked questions that I receive during workshops and trainings.

1. What is GIS?
2. How are historians using GIS?
3. Why should I use GIS to teach history?
4. How can I get started using GIS in my classroom?

WHAT IS GIS?

A Geographic Information System is a digital mapping program that allows users to view a map as layers of information that can be manipulated to visualize, question, and analyze patterns and connections. The way that I explain GIS to my colleagues to make it less technical is to have them think about the words behind the letters:

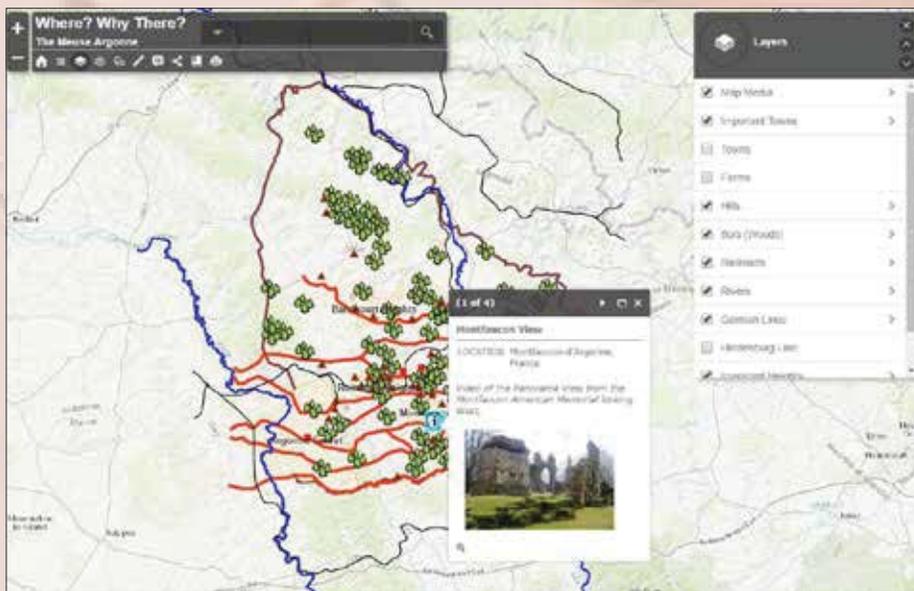
G is for geography—it represents the map.

I is for information—it represents a spreadsheet of information (think of a spreadsheet of major cities with historical census records).

S is for system—it represents how the map and the spreadsheet interact to visualize and analyze geographic information.

These tools are ubiquitous in our lives today. Whether it is using Google Earth to tour the National Mall, watching the news to monitor the path of a winter storm, or going to USPS.gov to track the status of a package we recently shipped, these technologies speak to the current generation of students and are providing innovative and dynamic resources for multiple disciplines. For example, I recently watched a CBS news clip on how LiDAR GIS technology is being used to locate Mayan Ruins and will provide new insights and understanding about that empire.¹

If you are looking for ways to save time, promote inquiry,
and be more efficient with teaching, then you
need to give GIS a try.



An interactive GIS map that helps students better understand the significance of the Meuse Argonne Offensive and the ending of World War I.

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HOW ARE HISTORIANS USING GIS?

Recognizing the role that GIS plays in the field of Digital History, numerous books have been published to help historians better understand how the technology can be used to inform and enhance research. Two works that I heavily rely on for ideas and approaches are *Past Time, Past Place: GIS for History* (2002) and *Placing History: How Maps, Spatial Data, and GIS Are Changing Historical Scholarship* (2008). These books were edited by Anne Kelly Knowles, the Col. James C. McBride Distinguished Professor of History at the University of Maine. In 2012, Dr. Knowles was awarded the 2012 American Ingenuity Award by the Smithsonian, recognizing her contributions to history using GIS.³

She graciously agreed to respond to a few questions and share her thoughts on using GIS for historical research.

How has GIS influenced the way that you approach teaching, research, and writing?

GIS has enabled me to bring geographic imagination and problem-solving to my research, which has deepened my geographic understanding of the past. That, in turn, has made my historical teaching more richly geographical. The way GIS works on the imagination, particularly by stimulating spatial questions and providing visual answers, has helped me describe places and spatial phenomena in words. If you can see the past geographically, you can better describe its circumstances.

What are some of the projects and publications that you have completed that leveraged GIS?

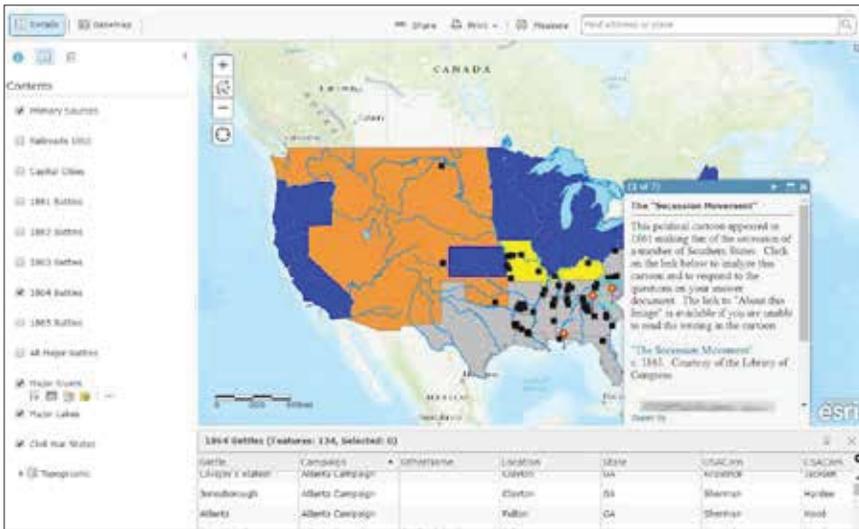
I'd actually put it the other way around, that GIS has enabled me to do a number of major research projects that would have been impossible without it. This applies to *Mastering Iron: The Struggle to Modernize an American Industry, 1800–1868* (2013), which is based to a significant extent on an HGIS of the antebellum iron industry. It also applies to most of the work I have done over the past decade on the geographies of the Holocaust, where GIS was fundamental to a number of my research group's case studies (*Geographies of the Holocaust* [2014]). And there's my study of Gettysburg using viewshed analysis on a digital reconstruction of the battlefield. That is still the most technically demanding project I have done, and the one that would have been least possible without GIS.

Why should historians embrace GIS as a research tool/technology?

I'd say try it, experiment with it, and talk with others who have used GIS extensively before embracing it. Learning how to use GIS well takes time, and, one way or another, time means money. Both time and money are precious! But I would encourage people to explore how GIS has been used by others because much of the work is really inspiring. GIS can enable more ambitious projects while grounding your research in geographic context. It supports all kinds of comparative research, which is very valuable for getting yourself out of a rut or a habitual way of thinking. And because GIS is a really valuable skill in the world of work, it has double value for students—it can get them involved meaningfully in a professor's research while improving their employment prospects.

Is there anything else you think scholars should know about your work or the use of GIS in history?

It is on the rise. Art historians are now using GIS to study everything from the sonic geography of religious processions in Florence, Italy, to where works of art traveled around the world. The "spatial turn" in the humanities is still largely theoretical, but it's gradually becoming more empirical, and GIS is very much a part of that evolution.



A screen capture of a Civil War GIS map that contains layers for battles, railroads, rivers, cities, and geo-tagged primary sources.

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At the heart of GIS mapping, and what separates it from traditional maps, is data. Geospatial data is information connected to a geographic element that can be represented as a point, line, or polygon, and most often represents real locations on earth. The information is organized into different layers and one can choose the layers of information they want to map, explore, and analyze.²

WHY SHOULD HISTORY TEACHERS USE GIS?

If you are looking for ways to save time, promote inquiry, and be more efficient with teaching, then you need to give GIS a try. It may prove to be one of the tools you've been looking for. GIS maps are interactive, make teaching complex concepts more efficient and effective, and provide our students with experiences using leading-edge, high-demand technologies (many of my historically minded GIS students have completed digital history projects for museums, universities, and non-profits).

GIS maps are not the “what you see is what you get” maps that we often interact with in our textbooks and presentations. The maps are “live.” That is, the information and symbols on the map can be changed on the fly with the click of a few buttons. Map

layers and features can be turned on or off to reveal different patterns. The map can be manipulated based on scale (zoom in on one state or region), the time period for specific events (show an animated map of liberated territory following the D-Day invasion), or on the academic abilities of your students (manipulate the map so that it does not show too much or too little information). Take, for instance, this GIS enabled map (<http://bit.ly/CivilWarGIS>) I use when teaching about the American Civil War. With this one map and the click of a few buttons, I can:

1. Show a political map of the United States in 1861 visualizing which states were part of the United States of America, Confederate States of America, or were border states. Students can re-symbolize the map to show how each state or county compared with regard to population, industry, and agriculture.
2. Turn on layers to show major cities, railroads, and rivers in order to discuss the role of transportation, urbanization, and regionalization.
3. Turn on the layer for major civil war battles and filter the map to find out how many battles happened within fifty miles of

Richmond, Virginia, or only those involved in the Gettysburg Campaign.

4. Annotate the map by adding map notes to certain locations and hyperlinking primary sources that I want my students to analyze.
5. “Crowdsource” my students’ research and opinions by having them add their own map notes and annotations based on key people, events, or documents using a computer, tablet, or smartphone.
6. Assign my students a research project and use the same Civil War map as the base map they can reference and personalize to create their own multimedia story map.

In a textbook, each of these maps would probably be on different pages and require a lot of flipping back and forth between pages. With GIS, it is a snap, because all of this information is on the same map!

HOW CAN I GET STARTED USING GIS IN MY CLASSROOM?

Ten years ago, using GIS in the history classroom was a hard sell. The software was cumbersome, data sets limited, and classroom ready lessons were few and far between. Fast forward to today, and K-16 access to GIS is at an all-time high,

the software is web-based, and there are many beginner to advanced GIS activities readily available. Here are my suggestions for getting started:

1. My go-to for seamlessly incorporating GIS into my teaching is Esri's GeoInquiries (<http://bit.ly/GeoInquiries>, and click on "Gallery"). I use these activities to teach both my high school and college students. GeoInquiries are fifteen-minute activities that incorporate advanced web-mapping technology. Each activity in the collection contains a teacher's guide with questions and answers, and a professionally designed WebGIS map. No installation, fees, or logins are necessary to use these materials and software. There over one hundred activities available, including specific collections for U.S. History and World History. Some of the ones I used this year include the Age of Exploration (World History), the Great Exchange (U.S. History Collection), and Sacred Place, Sacred Space (Advanced Human Geography).
2. Go to ESRI's Story Map Gallery (<http://storymaps.arcgis.com/en/>, and click on "Gallery") and browse ready-made interactive maps. There you will find maps pertaining to the Civil War, World War I, and Homer's *Odyssey*, as well as countless more. My personal favorite, which I use to teach about migration at the turn of the century, is "Geography,

Class, and Fate: Passengers on the Titanic" (<http://storymaps.esri.com/stories/titanic/>). Later this year the Virginia Geographic Alliance will be publishing twelve Teaching with Primary Sources story maps that align with key benchmark topics in U.S. history.

3. Once you become familiar with using GeoInquiries and Story Maps, register your school for a free ArcGIS Online (AGO) organizational account. There is no catch. Register your school through ESRI's website and gain access to a lot of GIS bells and whistles that include an organizational account that allows you to enroll and manage 500 student accounts; the ability to create customized classroom or student maps; and access to advanced functions of ArcGIS Online, such as density analysis, proximity analysis, and interpolation. With these accounts you can have students become digital historians that research, design, and create their own story maps. It is a great option for technically savvy students. You can register for an account at <http://www.esri.com/industries/education/software-bundle>.
4. Check out these seven ready-to-go GIS for US History maps that I co-authored with Christine Esposito (<http://www.gisetc.com/mushago/>). These maps accompany the workbook *Jamestown to Appomattox: Mapping U.S. History Using GIS*,

which contains 21 lesson plans.

5. Consider taking a class or attending a workshop focused on using GIS in the classroom. There are many options available. This summer the Virginia Geographic Alliance will be hosting a five-week online asynchronous course, "Putting Social Studies in its Place 2.0," that will cover beginner and intermediate skills, and focus on ways to seamlessly integrate GIS into social studies. If you are interested in learning more about the course, complete this simple Google form, and we will send you registration information (<http://bit.ly/VGAGIS>).

CLOSING THOUGHTS

The skills and concepts taught in history are timeless—asking essential questions, conducting source work, considering multiple perspectives, etc. What are not timeless are the tools we use to teach our discipline. Twenty years ago we were beginning to integrate PowerPoint and WebQuests into our teaching. Ten years ago we began to use digital documentaries and Web 2.0 tools to advance instruction. Now is the time to embrace geospatial tools to help bring to the surface the interplay between space, place, and time. Whether you have fifteen minutes or ninety minutes, there are activities and resources available to jump right in. Believe me—you will be impressed, and so will your students. ■■■

ENDNOTES

1. "Archaeologists Uncover Massive Network of Mayan Ruins with Laser Technology," *CBSNews*, Feb. 5, 2018, <http://bit.ly/MayaGIS>.
2. Pennsylvania State University created an excellent video series, "The Geospatial Revolution Project," that does a great job defining and explaining the power of GIS mapping. You can access each of these four videos at <http://geospatialrevolution.psu.edu/>.
3. To watch a short video detailing some of her contributions, visit <http://bit.ly/KnowlesGIS>.