lar forms, the focus is on the causes and primary and secondary prevention of specific types of cancer, their aggregation in particular sites, and how to reduce the local and global health impact of the production, sale, and use of tobacco products worldwide. *The Cancer Atlas* has six sections of unequal length: introduction, risk factors, burden, economics, taking action, the future and the past, followed by two tables of world data. *The Tobacco Atlas* begins with a brief discussion of types of tobacco, followed by five sections: prevalence and health, costs of tobacco, the tobacco trade, promotion, and taking action, and concludes with two tables of world data. Both volumes include time lines of key events and discoveries, glossaries of frequently used terms, sources, useful contact information, indexes, and numerous graphics and illustrations. While the reading level is adequate to convey the complex technical subject matter, the authors have taken care to ensure that the text is accessible to readers with no more than a high school education.

Neither of these publications fit the usual definition for a disease mapping atlas. In the case of cancer, only a few pages provide maps of the distribution of specific types of cancer around the globe. Only four maps focus explicitly on cancer incidence or prevalence. One map shows the leading type of cancer incidence in each country for males and females, respectively, while a second depicts the "geographical diversity" of specific cancers by focusing on the incidence of six types: liver, esophageal, and testis in males and breast, stomach, and cervix cancer in females. The third cancer incidence map shows worldwide patterns of lung cancer incidence for males and for females for the year 2002. The final plate on cancer incidence examines patterns of cancer among children under the age of 15 but displays these data in bar and pie chart form rather than on a map. These maps enable the reader to discern broad patterns in the spatial distribution of cancer incidence, but more detail would be helpful. For example, while breast cancer is the leading type of cancer among females in developed nations and many others in Africa and South America, cervical cancer is the predominant type of cancer among females in southeast Asia, central America, and sub-Saharan Africa. How long have these patterns persisted?

Where one might have expected detailed maps of cancer incidence and prevalence, we find numerous plates focusing on risk factors for various sites and types of cancer, including a plate depicting international patterns of smoking among men and women (repeated in the *Tobacco Atlas*), as well as plates showing patterns of infection, diet and nutrition, levels of ultraviolet radiation exposure, and reproductive and hormonal risk factors. Other plates show which countries have population-based cancer incidence registries, how much is expended on cancer research, and several patterns of cancer prevention.

The Tobacco Atlas clearly differs from traditional disease atlases in that its focus is on the uses and health risks of tobacco rather than on specific diseases *per se*. Here we find numerous plates focusing on tobacco use among adult males and females and boys and girls, exposure to passive smoking, and types of tobacco products used most commonly around the world, as well as the economic aspects of tobacco production, trade, and taxation. Only a single plate focuses explicitly on tobacco-related mortality. Even casual readers of this atlas will find a wealth of details about all aspects of tobacco placed in international context. As with *The Cancer Atlas*, the plates, diagrams, charts, and tables in *The Tobacco Atlas* will raise as many questions as they answer–and that is clearly a primary intent of the authors and the American Cancer Society which published both volumes.

Readers looking for handy and concise guides providing a public health perspective on the geography of cancer and of tobacco use and its implications will find these atlases extremely useful. Published in paperback editions at a relatively nominal price, medical geographers may wish to add them to their reference shelves. Map librarians may wish that these volumes were available in hardcover form for durability and should anticipate new editions of each atlas every three to five years. [Note from the editor: A second edition of the *Tobacco Atlas* is now available.] If these atlases increase public awareness of the global implications of tobacco use, international aspects of cancer incidence, and relatively inexpensive opportunities for primary prevention, the publications will have served their intended purposes. Let us hope that this will be so!

GIS for Homeland Security
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Since the creation of the Department of Homeland Security in 2002, the United States has been looking at ways to connect diverse and fragmented networks of information that can collectively assist in predicting, preventing and/or responding to terrorist attacks and natural disasters. *GIS for Homeland Security* describes the use of GIS technology for specific applications that will enable and further these goals.

GIS for Homeland Security is comprised of six chapters, the first five of which describe specific GIS applications related to homeland security. Each chapter includes three actual case studies demonstrating how these applications are being put into practice throughout the United States. The final chapter provides a look at the future of GIS for homeland security applications.

Data sharing is presented throughout the book as a key component of successful homeland security initiatives. Without some level of cooperation between local, regional, state, and federal entities, critical information may not be available where it is needed during a catastrophic event, or needless time and expense may be wasted in duplicative efforts. *GIS for Homeland Security* clearly indicates that, although much progress in coordinating available resources has been made since September 11, 2001, a great deal of work still needs to be done before GIS reaches its full potential as a universally available and usable tool for emergency planning and response.

Chapter One, "Gathering and Analyzing Intelligence," explores the daunting task of gathering and consolidating data from a variety of sources to create a single, comprehensive framework for emergency management purposes. The data must be easily accessible to emergency responders, yet adequately secured from individuals who would seek to misuse it. The "information sharing environment" called for by the President and Congress to combat terrorism involves not only law enforcement and intelligence agencies, but the general public's awareness of suspicious activity and knowledge of where and how to report it.

One of the case studies in Chapter One concerns the Emergency Management Mapping Application (EMMA) that helps monitor and protect the national capital region from natural and manmade threats. Towson University developed this Web-based initiative for the Maryland Emergency Management Agency in 2003 using ESRI mapping capabilities. EMMA had its first test that same year when Hurricane Isabel threatened the area with storm surge flooding. EMMA was able to direct the correct placement of sandbags at the Frederick County Reservoir in a fraction of the time it would have taken using standard field location methods. EMMA is compatible with other local and national GIS initiatives and has received high marks from independent consultants when measured against the federal government's technical standards.

A second case study involves South Carolina's use of GIS to collect and manage intelligence data. The South Carolina Information Exchange (SCIEx) also integrates the state's sex offender dataset, as well as information from the corrections system, court system, and similar agencies.

The third case study highlights the Arizona Counter Terrorism Information Center (AcTIC). Two hundred representatives of local, state, and federal law enforcement agencies encourage Arizona's citizens to report any suspicious activity they might see in public transportation corridors and other areas of interest to terrorists. This information is then entered into a GIS database and made availablefor homeland security operations.

Chapter Two, "Protecting Critical Infrastructure," describes the need to protect a community's vital buildings, systems, and resources from all types of emergency situations. Critical infrastructure includes high-profile buildings where government activities take place, as well as utility systems, communication networks, transportation systems, military installations, hospitals, chemical plants, agricultural and food supplies, financial systems, and other essentials. GIS can be used to locate and identify these sites, as well as assess risk, apply an evacuation radius, and analyze emergency management response time.

The CARVER method is presented as a means of assessing critical risk beyond the limited scope more routinely applied to natural disasters alone. CARVER is an acronym derived from the first letters of each designated step:

C*riticality* – Identify critical assets, single points of failure, or "choke points."

A*ccessibility* – Determine ease of access to critical assets.

R*ecoverability* – Compare time it would take to replace or restore a critical asset against maximum acceptable period of disruption.

V*ulnerability* – Evaluate security system effectiveness against adversary capabilities.

E*ffec* – Consider scope and magnitude of adverse consequences that would result from malicious actions and responses to them.

R*ecognizability* – Evaluate likelihood that potential adversaries would recognize that an asset was critical.

One of the case studies in Chapter Two highlights Kentucky's Chemical Stockpile Emergency Preparedness Program (KY CSEPP). The Blue Grass Army Depot is under mandate to eliminate its chemical stockpile while minimizing risk to the surrounding area. However, the rural area of Kentucky impacted by the depot had been relying on hardcopy methods of documentation and did not have money available for GIS and other digital data management applications to guide this process. Grant funding was ultimately obtained to implement a mapping support system.

It was important to map the three thousand-square-mile area surrounding the depot and analyze disaster preparedness in that region. Data was collected and compiled over a five-year period. GIS eliminated the need for hardcopy recordkeeping, and ongoing maintenance kept the system current all along the way. Web-based applications are now available to emergency management personnel and various government agencies for traffic surveillance, crisis management, evacuation routing, and chemical plume modeling analysis.

Other case studies for infrastructure management included an application for real-time video surveillance of airports, seaports, utilities, and other high-profile locations, as well as the coordinated GIS program used by the TriValley region of the Northern California Bay Area.

Chapter Three, "Responding to Complex Emergencies," involves rapid response needs for saving lives and property. GIS can deliver aerial imagery, floor plans, hazardous material locations, and other critical information to emergency management personnel. The California Fire Service created the incident command system (ICS) to assist firefighters by integrating resource data for complex emergency response.

The key features of an ICS are:

- A unified approach to incident management;
- A common terminology for clear communication;
- A generic organization structure that provides for interagency cooperation;
- A chain of command with accountability;
- An efficient use of resources.

California's ICS model ultimately formed the basis for the National Incident Management System (NIMS) utilized by the Department of Homeland Security to standardize the approach to disaster response. GIS helps visualize the nature and aftermath of a disaster with a variety of mapping applications.

One of the case studies for Chapter Three involves Hurricane Katrina, which brought to light disparities between NIMS standards and resulting emergency response. It was clear that NIMS had put in place a system suitable for disasters of a limited nature but did not provide what was needed to address an incident with the catastrophic proportions of Hurricane Katrina. Following the disaster, GIS was used to prioritize repairs, assess loss, and direct various levels of response. Volunteers worked around the clock to integrate disparate GIS and communications data in a format suitable for widespread use.

GIS for the Gulf, a combined effort of the U.S. Geological Survey, National Geospatial Intelligence Agency, and the Department of Homeland Security, is now assisting in preparedness efforts for future hurricanes, as well as long-term recovery needs for areas already devastated by Hurricanes Katrina and Rita in 2005.

The train wreck in Graniteville, South Carolina that released a deadly cloud of chlorine gas in January 2005 is the subject of another case study. Graniteville, about eight miles west of Aiken, is a small, rural town with a population of 7,000 residents who rely upon a small volunteer fire department. A disaster of this magnitude required assistance from other emergency management teams as well as by GIS applications. GIS helped analyze the potential spread of the chlorine plume and the areas in subsequent need of evacuation. The GIS data was continually updated and redistributed over the course of a two-week response effort, and the orderly evacuation plan it coordinated helped save many lives.

The third case study summarizes the use of mobile GIS by California firefighters to help coordinate a widespread response to wildfires in the San Bernardino Mountains. The mobile GIS units enabled firefighters to follow the spread of the fire in almost real time, which facilitated evacuations, fire lines, equipment movement, and even criminal investigations in the fire-ravaged area.

Chapter Four, "Preparing for Disease Outbreaks and Bioterrorism," outlines the use of GIS for public health applications. It is important for officials to know who may be exposed to a disease and how it might spread, whatever the source of the outbreak might be. Part of the homeland security initiative is to protect our nation's food supply from disease and bioterrorism, so GIS is used in tracking everything from West Nile Virus to Mad Cow Disease. By 2009, the National Animal Identification System (NAIS) is expected to have a database capable of following livestock from birth through entrance to the food chain to help limit the scope of potential disease outbreaks.

One of the case studies describes New York City's syndromic disease surveillance program. Using information gathered daily from emergency departments around the city, GIS is looking for any kind of increase or clustering of syndromes that might indicate a natural or bioterrorist disease outbreak. The system is automated and requires no user intervention. The syndromic approach is not looking at actual diagnoses, but at symptoms of disease, which may be the first indicators of any kind of widespread outbreak. The system helped health officials predict a flu outbreak two weeks before it hit, thus providing medical personnel a chance to prepare.

Another case study showed how Pennsylvania is using GIS to monitor the spread of West Nile Virus. Mosquito breeding areas are mapped, since mosquitoes help spread the disease.

A case study from Kansas looks at GIS used to track disease in cattle. GIS is helping reduce the impact of outbreaks among livestock through early detection and containment, as well as preventing contaminated livestock from ultimately entering the food chain.

Chapter Five, "Securing Complex Events," conveys the potential for terrorist attacks on large-scale sporting, political, or entertainment events. GIS can help monitor and identify security vulnerabilities, as well as facilitate response plans. Disaster preparedness exercises are highly encouraged and should include responding to nuclear, biological, chemical, explosive, and cyber attacks, as well as every type of natural disaster.

Case studies for chapter five include the preparation for and prevention of terrorist attacks on the Salt Lake City Winter Olympic Games, which occurred only five months after September 11, as well as the 2004 Democratic National Convention and the 2007 Super Bowl. GIS played an important role in coordinating data from multiple agencies to assess risk and establish emergency management and response plans for these events.

Chapter Six, "Looking Ahead," examines the need for consistency, coordination, and collaboration of GIS assets for the benefit of homeland security applications. The National Spatial Data Infrastructure (NSDI) provides the groundwork for technology and data sharing policies that can be utilized by all organizations using GIS. A key component of this initiative is the National Map. The National Map can only come to fruition with the critical input of local, state, and tribal interests; however,a study in 2004 showed that many such interests were reluctant to participate, since they could not be sure how or if the National Map would benefit them directly. Work is ongoing to change perceptions and elicit the necessary cooperation between organizations at every level of government.

GIS for Homeland Security includes a list of acronyms and abbreviations, as well as a glossary of homeland security terms. In the center of the book, between chapters three and four, are four GIS profiles of dedicated professionals who have used GIS in their positions as, respectively, California firefighter, Kentucky Chemical Emergency Planner, FEMA GIS Team Member, and Duke University Environmental Science Professor.

I found *GIS for Homeland Security* very informative overall, with a good mix of text, diagrams, and illustrations. The general principles and case studies presented are well suited to GIS professionals at every level. I would recommend this book to anyone who wants to know more about emergency management practices and homeland security applications, as well as anyone who is just curious about the impact of September 11, 2001, on government services in general.

I was particularly impressed with the CARVER method of assessing risk, which was outlined in chapter two. These guidelines could be easily customized to address virtually any type of security concern for locations ranging from rural neighborhoods to vast cities. That being said, I would like to have seen some actual case studies outlining emergency management applications on a smaller, more everyday scale. For example, what can the typical American suburb do on a shoestring budget to enhance its emergency preparedness, even if the most likely emergency is something as mundane as a house fire? In addition to learning what GIS programs can do to manage regional disasters, I had hoped to find out how the small-scale applications in my area might compare with similar applications elsewhere.

According to *GIS for Homeland Security*, as in other books I have read on GIS, one of the biggest roadblocks to creating any kind of centralized GIS, whether locally or nationally, is data sharing. In the civil engineering environment in which I work, an individual municipality or related organization generally solicits GIS implementation to streamline planning and development projects within its own boundaries. They are concerned that if they share their GIS data with larger entities, it may be redistributed for or incorporated into projects they do not feel are in their own best interests. In addition, a great deal of money is often invested to create the GIS data in the first place. Sharing their data, even for homeland security initiatives, often makes a municipality feel that it has unwillingly lost control of a valuable asset, and that its chances to recoup the costs involved or even to profit from the GIS data have been negated.

I have long been of the opinion that if a municipality or related organization is to be persuaded to relinquish a copy of its GIS data to a larger organization, some type of monetary incentive should be involved. Not grant funding*per se,* but some kind of system of ongoing fees that would encourage cooperation at every level. For example, a municipality sharing its GIS data with an outside organization would receive a pre-determined payment. If the outside organization then incorporates the municipality's GIS data into another project and ultimately shares that project with others, the municipality would receive an additional fee. If even a nominal type of fee arrangement system could be standardized across the industry, similar to the royalty system currently used in the publishing industry, it might be a very attractive incentive for even the smallest municipality, authority, or organization to create and freely distribute the local GIS data so valuable to homeland security and other beneficial applications.