healthyGIS

ESRI • Spring 2010

GIS for Health and Human Services

Leveraged GIS Improves Health Assessment Process

By Riju Stephen, Mark Perry, and Beverly Nichols

Houston, the largest city in Texas, has many neighborhoods where living standards fall well below national standards. The Houston Department of Health and Human Services (HDHHS) reaches out to these communities with a program, Assessment Intervention and Mobilization (AIM), that tries to connect needy households with appropriate service providers. During an AIM project, hundreds of HDHHS employees and volunteers visit every household in a neighborhood, interview residents, and connect those in need with service providers. In 2009, HDHHS leveraged existing city geographic information system (GIS) resources to plan, allocate resources, and execute an AIM project in the Greater Fifth Ward neighborhood.

"GIS was the key element in the planning process," said Dr. Faith Foreman, assistant director in HDHHS. "It improved efficiency by making it easier to create division/team boundaries for better management of the operations. The maps provided the ground truth about the neighborhood prior to visits by the team members."

ESRI's ArcGIS software was used in project management to aggregate census blocks and section the neighborhood into divisions with approximately the same number of households. The divisions were further subdivided into teams, which served as the basic units for manpower allocation. Each team was assigned a team lead and had several members.

In addition, location-based selection of staging areas for each division provided a strong foundation for project planning and logistics. The City of Houston's Department of Planning and Development provided the neighborhood boundary files. U.S. Census Bureau TIGER/Line files (census blocks) and 2000 Census data (number of households) were used to determine the spatial distribution of households in the neighborhood.

Using the census data, the Fifth Ward neighborhood was separated into divisions of approximately 1,000 households each. This was achieved by spatially selecting contiguous blocks and using the statistics tools in ArcGIS to obtain the total number of households in the selection. Divisions were subdivided into groups of at least 500 households. Physical contiguity,

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In This Issue

Census information was used to section the neighborhood into divisions with approximately the same number of households.

Combating the Asian Tiger Mosquito

For the County of Mercer, Mosquito-Borne Diseases Pose a Serious Challenge

By Matthew Kabak, Eric Williges, Isik Unlu, Matthew Lawson, and Ary Farajollahi, County of Mercer, New Jersey

The County of Mercer, New Jersey, lies equidistant between New York City, New York, and Philadelphia, Pennsylvania. Its geographic diversity provides an ideal location to study mosquitoes and arthropod-borne diseases (arboviruses).

Mercer County Mosquito Control (MCMC) monitors, inspects, and manages all mosquito-related activities within the county. Its two main responsibilities are to monitor and control nuisance mosquito populations and protect the safety of the general public from mosquito-borne diseases, such as West Nile virus and eastern equine encephalitis. MCMC uses integrated pest management techniques, along with continual surveillance of local mosquito populations and responses to service requests generated by local residents, to keep mosquitoes at tolerable levels.

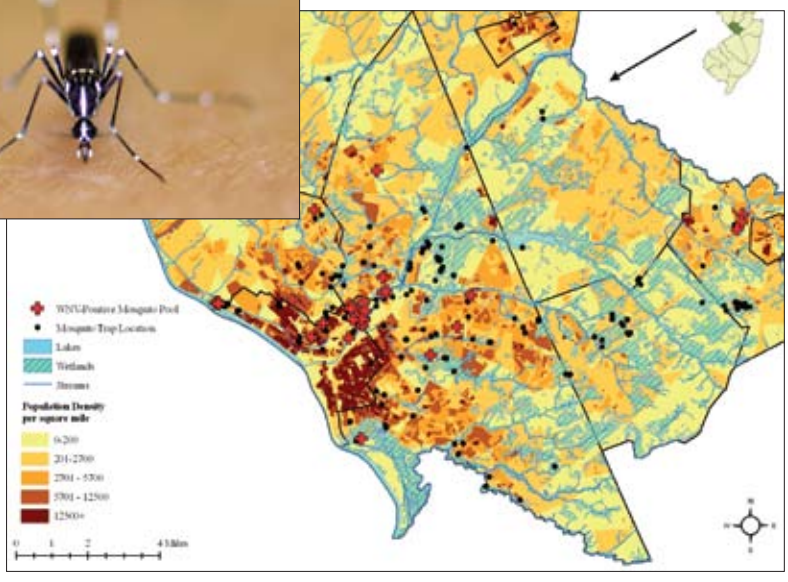
In recent years, populations of an invasive mosquito species, *Aedes albopictus*, the Asian tiger mosquito, have been increasing dramatically. Six arboviruses (eastern equine encephalitis, West Nile, Keystone, Tensaw, Cache Valley, and Potosi) have been isolated from this species since its introduction into the United States. This mosquito is also an efficient vector of nonendemic arboviruses such as dengue, yellow fever, and chikungunya. With globalization and modern travel patterns, it may be only a matter of time before an infected traveler imports one of these exotic diseases.

Asian tiger mosquito *Aedes albopictus*

MCMC has a great deal of spatial information to track, including larvicide applications for regulatory compliance, lab test results from trapped mosquitoes, and animal and human disease incidence for epidemiological purposes. For this reason, MCMC was one of the County of Mercer early adopters of GIS to help manage data. MCMC currently uses ArcGIS Desktop software to develop policy and daily inspection routines and manage most data.

"GIS not only provides me with an accurate visual depiction of where a mosquito habitat is located, it also allows me to visualize where other hidden potential habitats may lie," said Ron Oppenheimer, MCMC mosquito inspector.

The countywide GIS consists of an enterprise geodatabase managed with ArcGIS Server software and hosted at the county administration building in Trenton. MCMC accesses hydrologic, topographic, transportation, and demographic datasets in the enterprise geodatabase by consuming server-cached map services. MCMC also uses local individual datasets, managed with ArcGIS Desktop applications, to maintain spatial data specific to mosquito control issues, including data for a consortium research project on the surveillance and management of the invasive Asian tiger mosquito. This local data addresses a wide variety of needs, from tracking pesticide usage by each inspector to creating specific maps in response to a resident complaint or question.



Vector surveillance results collected during 2008 in Mercer County, New Jersey

In the field, MCMC inspectors use Trimble GeoXT GPS units and Pathfinder software from ESRI business partner Trimble Navigation Limited to track trapping and treatments at active mosquito sites and record work in response to residents' service requests. An overall view of their activity gives supervisors a visual way to identify hot spots that could correspond to high mosquito populations or disease activity. Mosquitoes are collected with a variety of vector surveillance traps and tested in the laboratory to determine the presence and prevalence of diseases such as West Nile virus and eastern equine encephalitis. After test results are imported into ArcGIS, supervisors can visualize virus activity and deploy inspectors to control adult mosquito populations in a precise and targeted manner. Maps of disease incidence and pesticide applications are used to compare current activity to historical activity.

Matthew Kabak is a GIS specialist for the County of Mercer, Eric Williges is a wetlands specialist for MCMC, Isik Unlu is an entomologist for MCMC, Matthew Lawson is a principal planner for the County of Mercer, and Ary Farajollahi is the superintendent of MCMC.

For more information, contact Ary Farajollahi (e-mail: afarajollahi@mercercounty.org) or visit nj.gov/counties/mercer/departments/mcmc.

From My View . . .

By Bill Davenhall
Global Marketing Manager
ESRI Health and Human Services

It's All about the Action

Stephanie Bailey, M.D., M.S., chief of the U.S. Centers for Disease Control and Prevention Office of Public Health Practice, recently reminded me that in the end, it's all about the action you take that really matters. She does not mean to say that you shouldn't plan and evaluate, but that planning and evaluating are poor substitutes for actually taking action—even if that action is to not take action. Bailey believes that a great deal of planning never gets to the action phase where public health can make a difference to people. This is insightful, to my way of thinking. It also makes me believe that being ready to plan and respond (take action) is an activity that every health and human services organization should practice every day. Many times, regardless of the amount of planning, responses are still ineffective, whether attempting to manage a new flu strain or diminish a chronic disease pattern. It always seems that immediately after the latest plan is drafted, a new, compelling imperative renders it inadequate. The days of just-in-time preparing and responding (acting) are becoming history.

Being prepared (planning) to respond (act) is no accident. Getting ready to act is the challenge. The next disaster is just lurking around the corner (plan on it), so being ready to respond (act) becomes the greatest organizational challenge. As with CPR, a hypothetical response is of little use to a person in need if you have never learned (planned) and practiced (acted) the technique.

I am always amazed at the number of health departments and health ministries that aren't ready to prepare (plan) or respond (act)—even after decades of compelling disasters.

The following is a simple test to see if your organization is ready to act:

Within the next 15 minutes, can you publicly share or access an electronic, geographically accurate database containing the precise location (latitude and longitude) for each of the following types of facilities within your official organizational jurisdiction?

- Every child care center (location where preschool children gather while their parents are at work)
- Every office-based physician practice (locations where physicians receive patients for diagnosis and treatment in the community)
- Every hospital (locations where medical or nursing services are provided to consumers)

Score 10 points for each database that is ready to go. Get ready, set, go!

OK—what's your score? Send me an e-mail (bdavenhall@esri.com) if you score more than 10 points, and I will send you a prize!

This brief exercise may have revealed several GIS readiness needs in your emergency response or preparedness plan. Here is what I am doing to help our customers get prepared:

No. 1—We are creating a GIS readiness checklist that will be made available online for health and human services agencies. The checklist will help objectively rate your organization's GIS readiness to prepare and respond. Participants will also be able to suggest additions to the list.

No. 2—We have joined a new collaboration (action) focused on creating a database of field-verified geographic locations for all the health care facilities in the world. The objective is to make this database a participant-created open vision that is free and accessible to anyone. The need for this kind of data was made painfully obvious, unfortunately, during recovery efforts following the recent earthquakes in Haiti and Chile. Why wait another minute to get ready for the next disaster?

If you are interested in joining the global health care facility database project, please contact Seth Wiafe, MPH, academic director, Loma Linda University Health GeoInformatics Program, by e-mail (swiafe@llu.edu) to be added to the global list of collaborating organizations.

I encourage your participation. And, as always, I invite your second opinion.

Regards,

Case Study

Arlington Food Assistance Center

Tapestry Segmentation Boosts Response Rates and Fund-Raising Dollars

The Arlington Food Assistance Center (AFAC), a nonprofit organization in Arlington County, Virginia, provides groceries to county families who cannot afford to buy basic food items. A major food pantry for the community, AFAC distributes groceries to approximately 1,200 families each week. In 2008, AFAC served 34,625 families and distributed more than 1.2 million pounds of donated food worth $1.9 million.

Challenge

- Increase donations during a time of higher services demand paired with a drop in donations from past contributors.
- Initiate a structured and cost-effective use of direct mailing lists.

Results

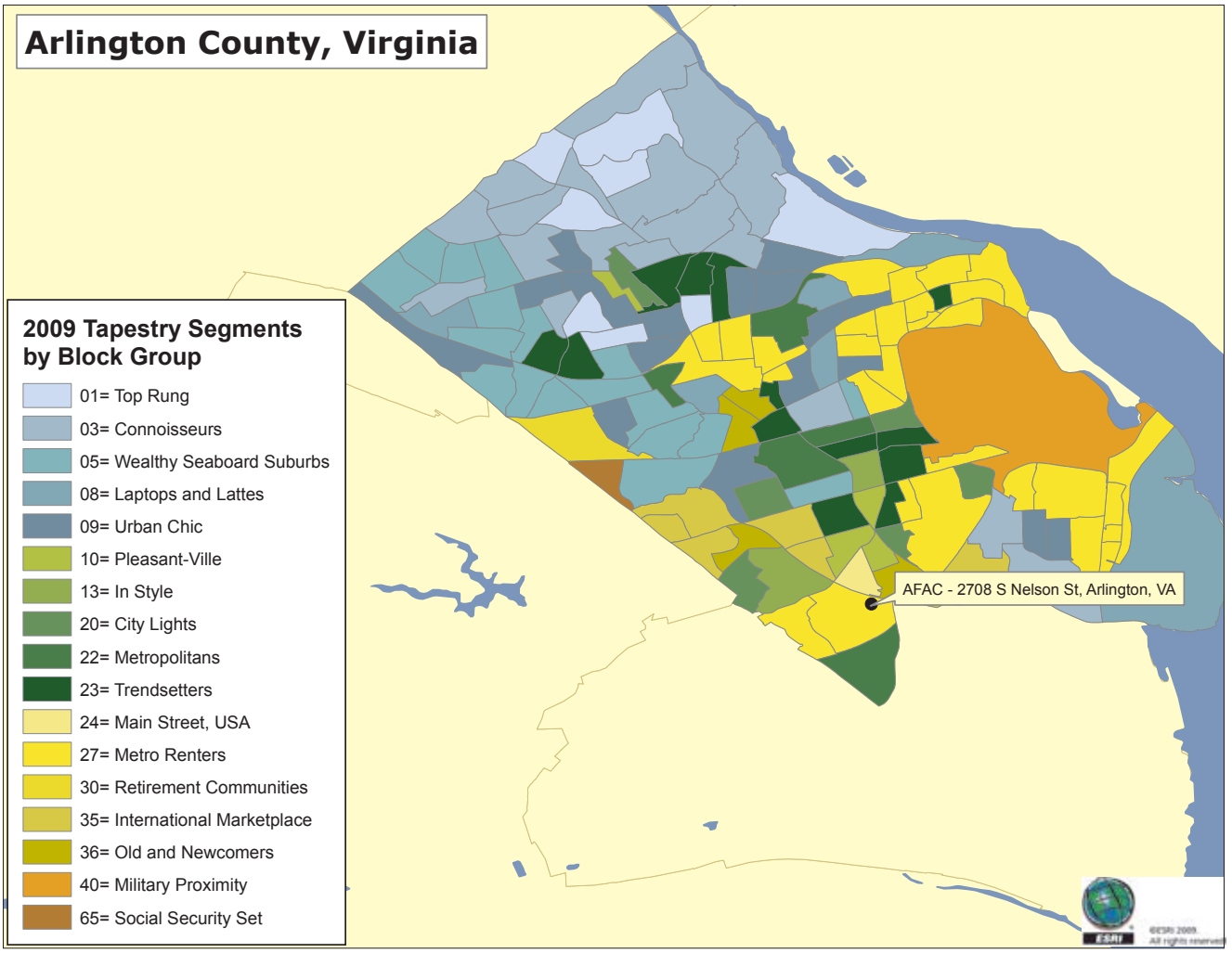
- Raised $67,000 from mailings for a 10:1 return on investment
- Added 275 new donors

The center operates with a small professional staff of 12 full- and part-time personnel, helped by volunteers who annually donate 17,000 hours of their time. The organization depends on Arlington community members to volunteer their time and give food and money to help combat hunger in the area.

AFAC's funding relies heavily on individuals donating through the direct mail program, for which AFAC maintained an in-house mailing list of past contributors. An increase in demand, paired with a simultaneous dip in donations, made it apparent to Christine Lucas, AFAC executive director, that the center needed to find new donors. AFAC also needed to control mailing costs by sending out a minimum number of letters that would still achieve maximum results.

Although the in-house list contained valuable contributors, there was no clear structure to it; names had been added over the center's 20 years of helping the community, sometimes without AFAC knowing why they were selected.

Lucas turned to ESRI for assistance after an ESRI staff member who volunteered at AFAC described how Tapestry Segmentation could



Address Coder generated a Tapestry Profile report that helped identify top-performing donor types at the block group level.

Families wait in line for food assistance at the Arlington Food Assistance Center.

identify new areas to target based on the best donor types.

ESRI analysts recognized immediately that, for AFAC to increase its direct mail response rate and dollar contributions, it must adopt a new direct mail strategy. The goal would be to send specially crafted appeal letters to targeted groups that were identified as the most likely to contribute.

ESRI's Tapestry Segmentation system provided an ideal way to identify the groups, and ESRI's Address Coder software easily appended Tapestry segment codes to each record in the existing contributor list. Tapestry Segmentation is market profile data that classifies all U.S. residential neighborhoods into 65 distinct segments based on socioeconomic and demographic characteristics. Each neighborhood is analyzed and sorted by more than 60 attributes. Address Coder is stand-alone geocoding and data-appending software that enables organizations to group U.S. address records by location, demographic characteristics, or consumer type.

The first step was to use Address Coder to geocode (assign a geographic location) each address in AFAC's existing contributor list. This identified the neighborhoods where the donors lived. Address Coder also appended the corresponding Tapestry Segmentation code to each record. The resultant Customer Tapestry Profile showed that AFAC's best donors came from four Tapestry segments and enabled AFAC to analyze its proven donors and find others like them. The analysis also helped AFAC better understand donor lifestyle behaviors and other demographic traits in order to craft a message that would appeal to each segment.

To reach new contributors, ESRI recommended that AFAC purchase a mailing list from Acxiom Corporation appended with ESRI's Tapestry Segmentation codes.

AFAC mailed letters to 20,000 existing and new donor households, which generated a total of $67,000 and added 275 new donors at a total cost of $6,500.

"Before turning to ESRI for our direct mail efforts, we did not understand how to best reach current and potential donors," said Lucas. "Today, we are able to craft and deliver mail pieces that better appeal to our existing and potential donors, plus increase our gift donations, while keeping our mailing list costs low. We could not have gotten this process off the ground without the help and input of ESRI."

> "AFAC has doubled its fund-raising results very easily! We have seen such a high return on our investment—we only spent a total of $6,500, which included the cost of the list, printing, and postage."
>
> Christine Lucas, Executive Director, Arlington Food Assistance Center

ESRI on the Road

Netsmart Connections 2010
May 3–6, San Diego, CA USA
www.netsmartconnections.com

HIMSS Asia Pacific 2010
Health Information Management Systems Society
May 26–28, Beijing, China
www.himssasiapac.org

National Environmental Health Association Conference
June 6–9, Albuquerque, NM USA
www.neha.org

2010 ESRI International User Conference
July 12–16, San Diego, CA USA
www.esri.com/uc

National Association of County and City Health Officials Annual Conference
July 14–16, Memphis, TN USA
www.naccho.org

2010 ESRI Health GIS Conference
October 18–20, Denver, CO USA
www.esri.com/healthgis

ESRI Online

Health Podcast

www.esri.com/podcast

Spatial Epidemiology: GIS as a Decision-Making Tool for Health Providers
Este Geraghty, University of California, Davis, discusses the value of GIS for health providers in better understanding and managing disease.

Mobile Inspection Application Project—Coachella Valley Mosquito and Vector Control District
Cary Roberts, GIS specialist, Coachella Valley Mosquito and Vector Control District, discusses how server and mobile GIS worked together to improve mosquito control in California's Coachella Valley.

GIS Helps Singapore Officials Analyze Dengue Outbreaks

Outbreaks of dengue fever, a flulike viral disease spread by mosquitoes, have recently risen in the Asia-Pacific region, killing three times more victims in 2008 than in recent years, according to the World Health Organization (WHO). In Singapore, where dengue fever is endemic, the National Environmental Agency (NEA) is creating digital maps of outbreak clusters using GIS technology to support its dengue control program. Identified areas are inspected quickly to prevent further disease transmission.

ESRI recently spoke with Tai Ji Choong, head of operations for the NEA, about dengue fever and the use of GIS-based maps for the surveillance and control of dengue fever in Singapore.

ESRI: Why is dengue fever more difficult to control and eradicate than malaria?

NEA: The *Aedes* mosquitoes that carry dengue fever normally breed in urban areas with clean, stagnant water near human habitation. At present, the most effective method of controlling or preventing dengue virus transmission is to combat the *Aedes* mosquitoes by eliminating potential breeding habitats. NEA takes evidence-based integrated vector control approaches to control dengue fever. We bring together different aspects of vector control and surveillance such as community outreach, education, enforcement, research, and GIS maps.

ESRI: Is eradication of dengue fever possible?

NEA: Eradication of dengue fever is not possible. What we can do is try reducing the number of breeding habitats.

ESRI: How do you control or prevent dengue transmission?

NEA: In Singapore, it is mandatory for general medical practitioners to notify the Ministry of Health of all dengue fever cases. The ministry, in turn, will notify the NEA for mosquito control. A dengue transmission cycle typically involves three factors: the human, the dengue virus, and the *Aedes* mosquito. Our operation is to control and prevent further outbreaks by removing the *Aedes* mosquito from the transmission cycle. We obviously cannot eliminate all mosquitoes, but we can remove the breeding habitats to minimize the mosquito population. In the event of an infection, the vicinity around the infected person becomes a target for our officers to take effective remedial actions. We perform inspections, then we fog the affected unit and its surrounding area to eliminate possible adult mosquitoes and prevent the spread.

ESRI: Is this where GIS becomes most useful?

NEA: Yes. Reported cases in an area form a dengue cluster—two or more cases occurring within 150 meters, with fever onset within 14 days of each other. We can identify these cases and map clusters within GIS. GIS helps to determine the area of operation and the manpower deployment required to try to survey and control the mosquito population. With GIS, we are able to analyze possible breeding sources such as markets, eating establishments, and construction sites. We are also able to view historical breeding data. GIS-based analysis helps us identify probable breeding sources and eliminate them.

ESRI: How does GIS compare to other methods of cluster detection?

NEA: GIS helps us do our work more efficiently. In the past, officers manually mapped clusters and identified areas to inspect. Now, with the dengue cluster model, we can geocode locations of cases and inspection parameters as soon as the Ministry of Health informs us of an infected person. This helps us identify potential areas that may be vulnerable, and work to eliminate infected mosquitoes. With the vast amount of data collected, GIS helps us manage it for further analysis that was not easily done previously on paper. We are currently working to deploy a GIS-based predictive model to further reduce dengue fever transmission.

For more information, e-mail Sara Boh at Sara_BOH@nea.gov.sg.

See Your GIS Work in Print

Did you give a talk or make a poster for an ESRI conference in 2009? Your presentation might make a great article for the *HealthyGIS* newsletter. For information about submitting an article, visit www.esri.com/health and click on *HealthyGIS* Newsletter, or contact managing editor Susan Harp at sharp@esri.com.

ESRI Health GIS Conference Connects Health Professionals

2010 ESRI Health GIS Conference

Join your fellow health and human services professionals from across the globe at the 2010 ESRI Health GIS Conference, to be held October 18–20, 2010, in Denver, Colorado. Use the opportunity to learn, network, and collaborate on leveraging GIS technology.

Our changing world is forcing us to rethink health everywhere—and GIS is helping organizations and communities around the world better understand and improve human health. Whether you are examining environments, evaluating programs, managing projects, coordinating care, or geographically enabling health information exchanges, this event is your chance to explore how to launch and grow your own effective GIS project.

For more information and to register, visit www.esri.com/healthgis.

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Leveraged GIS Improves Health Assessment Process

geometry of the division boundaries, and accessibility were also taken into consideration. Team members were allocated to teams based on the area, size, and number of households.

Land parcel data available from the Harris County Appraisal District (www.hcad.org) was used to generate maps showing residential households, large apartment complexes, and commercial real estate. For on-site navigation, maps were generated from this data at the parcel level, showing street numbers.

The maps ensured that the team members targeted only those households within the division/team boundaries.

"[The maps] were instrumental in successfully targeting the specific locations as well as tracking the progress made," said Solly Diaz, division manager, HDHHS.

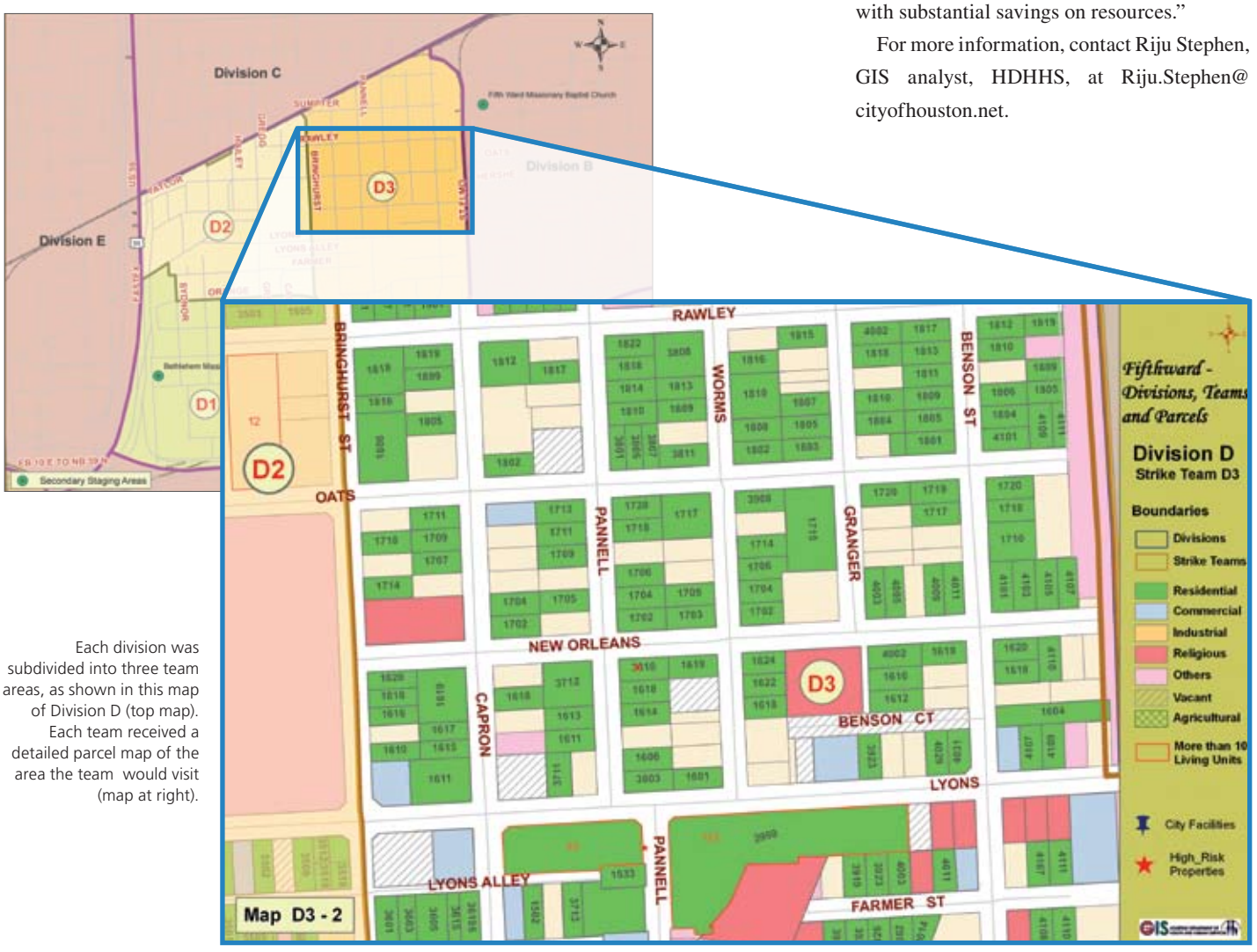
"The maps were the best way to organize things in the field," noted Carlos Bustamante, a public health investigator supervisor who worked as a team lead in the latest AIM project. "We could mark on the maps all the houses we had visited, and we could plan the movement of the teams in the field."

"Having the same large map at the command center and in the respective secondary staging areas was very helpful," added Diaz. "They greatly helped in ensuring that the teams stayed within the targeted area as well as in making better decisions about when and where to redeploy additional team members. However, the teams sometimes found it difficult to locate themselves in the field, as each team had several overlapping maps. I recommended we use a grid system in the maps so that communicating about the location would be easier."

The immediate impact of the AIM project in the Greater Fifth Ward neighborhood was that it identified indigent families and addressed their immediate basic needs. Needs were broadly classified as food/clothing, other basic needs, shelter, rent/utility assistance, elder services, counseling, job readiness/education, medical support, youth activities, and other (such as immigration, legal services, and day care). A total of 864 Refer-and-Link forms were processed to match appropriate service response teams with a family's identified needs, the majority being for food/clothing, rent/utility assistance, and home repair services.

"GIS helped us save time, money, and human resources," said Foreman. "Spatial summation and mapping formed the foundation of planning and execution of the AIM project with substantial savings on resources."

For more information, contact Riju Stephen, GIS analyst, HDHHS, at Riju.Stephen@cityofhouston.net.



Each division was subdivided into three team areas, as shown in this map of Division D (top map). Each team received a detailed parcel map of the area the team would visit (map at right).

GIS Laboratory Focuses on Health Geoinformatics

A new center will teach students in the health professions how to use GIS to better understand and improve human health across the world. In December 2009, Loma Linda University (LLU) School of Public Health inaugurated the Health Geoinformatics Laboratory, which will provide undergraduate and graduate students with hands-on experience in applying GIS technology in the fields of health and human services. The laboratory's two new classrooms are equipped with technology that includes ESRI spatial statistical tools for public health epidemiology, specialized logistical software for optimizing health care delivery, and geographic digital dashboards that enhance health informatics.

The university is in Loma Linda in Southern California. During the inauguration of the new center, LLU president Richard Hart (M.D., D.P.H.) spoke of the institution's century-held vision to produce a skilled and educated health workforce that will contribute to the enhancement of community and global health. He noted that the inclusion of the Health Geoinformatics Laboratory within this new global learning hub is a critical part of the university's objective to integrate geoinformatics into its curriculum.

ESRI president Jack Dangermond said, "Laura [Dangermond] and I join Dr. Hart and the wonderful people at this special place in starting an exciting journey, to take what we have done and actually fold it into the work that your students will do throughout the world to improve the lives of others."

The laboratory will support undergraduates who pursue a bachelor of science public health degree in health geographics or biomedical data management and graduate students seeking certificates in health geoinformatics. In addition, those taking specialized courses or doing research in areas such as environmental health, global health and development, and spatial epidemiology will also benefit from the facility.

For more information, visit www.llu.edu/public-health/geoinformatics.

Jack Dangermond (president, ESRI), Richard Hart (president, Loma Linda University), and David Dyjack (dean, LLU School of Public Health) inaugurate the new Health Geoinformatics Laboratory. (Photo by Richard Weismeyer.)

Universities Offer GIS in Health Courses

These courses are two of the most recent higher education offerings for GIS in health and human services.

GIS for Public Health

This course is intended for public health master's and doctoral students with an interest in the application of spatial methods to exposure and health data. Students learn how to use GIS software in the context of carrying out projects for visualizing and analyzing health-related data.

Taught by Philippe Amstislavski, assistant professor, Department of Biostatistics School of Public Health, SUNY Downstate Medical Center, Brooklyn, New York

Community Mapping

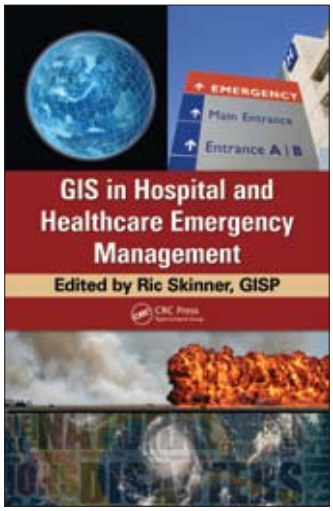
Directed toward graduate students in social work, this course teaches how to use mapping as a tool for understanding, organizing, and serving communities. Students learn how to use quantitative data and GIS within a conceptual framework to focus on how the environment influences individual and group outcomes.

Taught by Amy Hillier, assistant professor, codirector of the Cartographic Modeling Laboratory, Department of City and Regional Planning, University of Pennsylvania School of Design

New Book Makes the Case for GIS in Health Care Emergency Preparedness

In the first book devoted to the topic of GIS in emergency management and disaster preparedness in the health care industry, Ric Skinner, GISP, brings together 33 subject matter experts to discuss conceptual ideas, applications, and case studies that exemplify how GIS is improving health care preparedness. The book, *GIS in Hospital and Healthcare Emergency Management*, will be published and released by Taylor & Francis/CRC Press in spring 2010.

"The objective of this book is to bring to the forefront how hospitals and health care are benefiting from the use of GIS to improve their emergency management and disaster preparedness mandates and responsibilities," Skinner said.



GIS in Hospital and Healthcare Emergency Management
Edited by Ric Skinner, GISP,
the Stoneybrook Group LLC

The book's 16 chapters discuss the following:

- **Concepts** such as location-based hazard vulnerability assessment, spatial factors in workplace violence, nosocomial infection tracking, and logistics of supplies and resources
- **Applications** for trauma center site selection, mass-casualty incident planning, enterprise GIS, evacuation and sheltering, and hospital and disaster response
- **Case stories** about flu preparedness, vulnerable populations, needs assessment during natural disasters, regionalized incident planning, and integration of emergency medical service and hospital responses

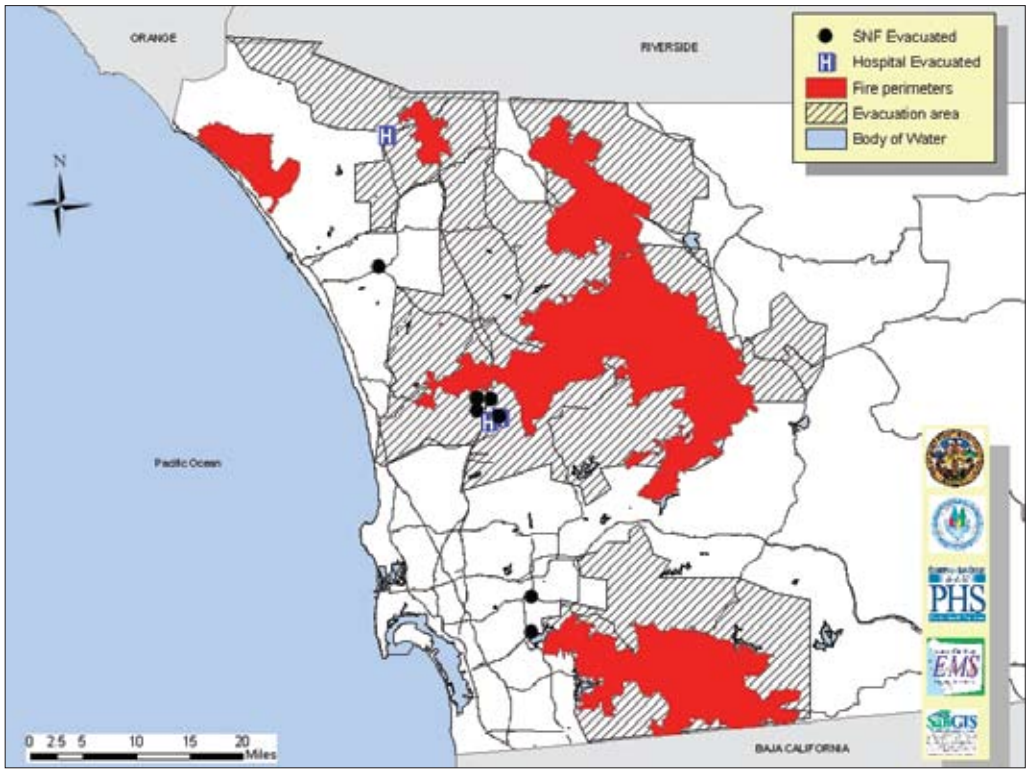
The book includes a CD with color images, useful forms, and exercises and is available from Ric Skinner (ric.skinner@gmail.com) or CRC Press (http://www.crcpress.com/product/isbn/9781439821299).

"If you want a successful system of emergency management at the local, state, tribal, or federal level, you must utilize GIS—period! … Ric Skinner has pulled together leaders and scientists from an incredible cross-section of those who are truly involved in the preparations for, and responses to, emergencies… My fervent hope is that those involved in emergency planning and operations will derive invaluable benefits and lessons from this book."

R. Tom Sizemore III, M.D., Principal Deputy Director, Office of Preparedness and Emergency Operations, U.S. Department of Health and Human Services

"Editor Ric Skinner is the real deal, one of America's best minds on the subject of pragmatic GIS applications… Ric has taken a very complex subject and made it understandable for local users who want to improve their response capabilities. The section on applications is a most welcome contribution to the literature. This book is a wonderful addition to the emergency preparedness toolbox."

John J. Shaw, DMD, Program Director, Capitol Region Metropolitan Medical Response System (Hartford, Connecticut), and Chair, RESF 8, Capitol Region Emergency Planning Committee



The final extent of fire perimeters, mandatory evacuation areas, and evacuated medical facilities in San Diego County, California, in October 2007 (from chapter 13 on disaster preparedness and response for vulnerable populations).

ESRI Posts New Geomedicine Web Page

A new ESRI Web page (www.esri.com/geomedicine) introduces visitors to the concept of geomedicine and the importance of considering a patient's environmental exposures when making health evaluations. It includes an interactive map that demonstrates how the results of health and environmental studies can provide new perspectives on personal health histories. Visitors can type in a United States address to retrieve location-based information on heart attack rates and registered toxic chemicals. Search results can be printed out in a report.

The new Geomedicine site also links to a video of the talk that Bill Davenhall, ESRI global marketing manager for health and human services, gave at the TEDMED 2009 meeting in San Diego, California.

This thematic map shows U.S. heart attack rates from Medicare data. Visitors to www.esri.com/geomedicine can use this interactive map for finding location-based environmental health information.

Can Geographic Information Keep You Healthy?

At TEDMED 2009, Bill Davenhall, ESRI global marketing manager for health and human services, used the metaphor of a train wreck to describe his personal experience with a heart attack. He suggested that not only the history of his health care, lifestyle, and genetics but also geography were factors that contributed to his health crisis. Davenhall gave his presentation, Can Geographic Information Keep You Healthy? to an audience of medical professionals, researchers, and celebrities at TEDMED, a conference that presents cutting-edge thinking about health from multiple perspectives.

Davenhall used his heart attack example to look at places he had lived—Scranton, Pennsylvania; Louisville, Kentucky; and Greater Los Angeles, California—and their respective documented environmental toxins. Each reported a different but toxic mix of chemicals in the air. Did these exposures contribute to his heart attack? Perhaps not, but his point was that a lifetime of environmental exposures should be considered when trying to decipher a patient's health problems.

"All the rich data collected by such organizations as the National Library of Medicine and the Environmental Protection Agency simply have not entered the picture when it comes to our face-to-face encounters with our physicians. I think this needs to change," said Davenhall. He suggested that the first step to connecting a patient's medical and geographic histories could be achieved using an electronic health record (EHR). The advantage of an EHR is that an accurate, full place history can be filled out just once (maybe even using an iPhone app) and made available to physicians as needed. EHRs might actually lighten the burden of massive record-keeping requirements on the modern physician's office.

Burning coal mine waste in Scranton, Pennsylvania

Aerial view of Rubbertown, a neighborhood in Louisville, Kentucky

However, the second step—the interpretation of geography and environmental exposures—depends on a physician's understanding of the concepts of geomedicine (the application of spatial analysis methods to medicine). To increase this understanding, Davenhall suggested that the education of health professionals include training in geomedicine. The place history of a patient could become a clinical marker and eventually unlock everything known about a patient's health risks related to toxic air, water, ground, and food exposures as well as culture and demographics.

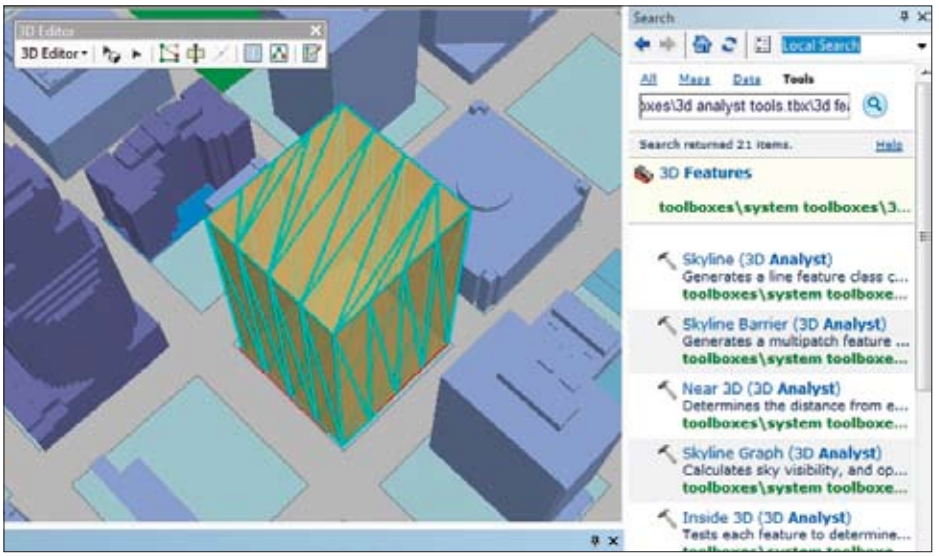
Obviously, Davenhall recovered from his heart attack. But his point about geography struck home. When he displayed a thematic map showing heart attack rates across the United States, people in the audience craned their necks to see it. The question in everyone's mind was, How high is the risk where I live?

You can see the video of Davenhall's TEDMED presentation at www.esri.com/geomedicine.

New Innovations in ArcGIS 10

Read more and view demo videos about ArcGIS 10 by visiting www.esri.com/whatscoming.

The ArcGIS 9.4 version has a new name: ArcGIS 10. Projected for release in the second quarter of 2010, ArcGIS 10 is a major release that dramatically transforms how people use and apply GIS. Various new features help you perform your GIS work faster. Following are just some of the ArcGIS 10 innovations.



The new ArcGIS search tool locates maps, data, or tools, as in this search that returns a list of new 3D editing tools in ArcGIS 3D Analyst.

Streamlined Productivity

- Search by keywords or data types to find data, symbols, and maps quickly.
- Save time through faster display, smoother navigation, and the ability to run geoprocessing in the background.

Spatial Analysis

- Combine ArcGIS with other scientific programming to reveal powerful answers in your data.
- Create, manage, and visualize time-aware data for more in-depth analysis.
- Perform in 3D virtually everything you can do in a 2D environment.

Access to Imagery

- Experience faster performance with accelerated image display.
- Easily manage massive image collections with dynamic mosaicking and on-the-fly processing.

New Ways to Share

- Increase collaboration via tight integration with ArcGIS Online search and share capabilities.
- Easily create and distribute projects that may include data, layers, maps, tools, scenes, globes, diagrams, and add-ins.

GIS in the Field

- Leverage streaming GPS, photo attachments, and location tracking.
- Access a new iPhone mapping application directly from the Apple iTunes App Store or build your own.

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Hear about the latest GIS innovations in health and human services and connect with people who share your interests at the following User Conference Health and Human Services tracks:

Tuesday, July 13

8:30 AM	Geomedicine (Health Industry Focus Session)
10:15 AM	Mapping Health Service Demand and Utilization across the Health Care Continuum
1:30 PM	Communicating Health Information with Innovative Web-Based Tools
3:15 PM	Mobile Workflows for Public Health Assurance

Wednesday, July 14

8:30 AM	Mapping Access to Health Care
10:15 AM	Enhancing Public Health Assessment with GIS
1:30 PM	Empowering Healthy Communities
3:15 PM	Improving Community Health

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