

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

Dedicated to CDC/ATSDR scientific excellence and advancement in disease control and prevention using GIS



Selected Contents: Events Calendar (pp.1-2); (pp.9-10); Public Health and GIS Literature Website(s) of Interest (pp.21-23); Final

News from GIS Users (pp.2-9); GIS Outreach (pp.10-18); DHHS and Federal Update (pp.18-21); Thoughts (pp.23-26)

I. Public Health GIS (and related) Events SPECIAL NCHS/CDC/ATSDR GIS LECTURES

June 12, 2002. "NASA Geospatial Science, Technology and Data for Public Health," by **Robert A. Venezia**, Program Manager for Public Health Applications, NASA Earth Science Enterprise and **Louisa R. Beck**, Remote Sensing Scientist, Center for Health Applications of Aerospace Related Technologies, NASA Ames Research Center, from 2:00-3:30PM. This NCHS Cartography and GIS Guest Lecture Series program will be held at the NCHS Auditorium, RM1100, Hyattsville, MD; Envision is available to offsite CDC/ATSDR locations; Web access is available to all others at <http://video.cdc.gov/ramgen/envision/live.rm> (link becomes active approximately 30 minutes prior to the event and viewing requires RealPlayer installation). See abstract for presentation in this edition.

[Note: Cosponsors to the NCHS Cartography and GIS Guest Lecture Series include CDC's Behavioral and Social Science Working Group (BSSWG) and Statistical Advisory Group (SAG). All NCHS Cartography and GIS presentations are open to the public. This is the **104th** presentation in this series. Contact: Editor, *Public Health GIS News and Information*]

[Note: Calendar events are posted as received; for a more complete listing see NCHS GIS website]

* 3rd National NEDSS Stakeholders' Meeting: "A Network of Networks for a Healthier Nation," CDC and Partners, May 8-10, 2002, Atlanta, GA [See: <http://sec.cdcmeetings.com/nedss>]

* Seventh International Conference on Remote Sensing for Marine and Coastal Environments, 20-22 May 2002 and the Fifth International Airborne Remote Sensing

Conference, May 22-24, Miami, FL [See: <http://www.veridian.com/events/conferences.asp>]

* Meeting at the Borders: Issues in Cross Border Research, Center for International Studies, May 22-24, 2002, Atlanta, GA, [See: <http://www.westga.edu/~borders>]

* DVD 2002: Standards, Applications, Technology, National Institute of Standards and Technology, June 3-June 4, 2002, Gaithersburg, MD [See: <http://www.nist.gov/DVD2002>]

* Healthy Ecosystems, Healthy People: "Linkages between Biodiversity, Ecosystem Health and Human Health", June 6-11, 2002 Washington D.C. [See: <http://www.ecosystemhealth.com/hehp>]

* 2002 National Association of Public Hospitals and Health Systems, June 19-22, 2002, San Diego, CA [See: <http://www.progressivehn.org>]

* First Annual Center for Environmental Health Sciences Scientific Conference, "New Directions and Needs in Asbestos Research," June 24-25th, 2002, University of Montana Campus-Missoula, MT [See: <http://www.umt.edu/cehs/Asbestos%20conference.htm>]

* 2002 National Environmental Health Association (NEHA) "Chemical and Bioterrorism Preparedness Conference," June 30-July 3, 2002, Minneapolis, MN [See: <http://www.neha.org>]

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

2

* Map Asia 2002: Asian Conference on GIS, GPS, Aerial Photography and Remote Sensing, August 7-9, 2002, Bangkok, Thailand [See: <http://www.mapasia.org>]

* American Psychological Association Annual Convention, August 22-25, 2002, Chicago, IL [See: <http://www.apa.org>]

* First conference of the National Center on Birth Defects and Developmental Disabilities (NCBDDD, CDC)-Charting the Course: Birth Defects, Developmental Disabilities, Disability and Health- "Honoring the Past and Framing the Future," September 17-19, 2002, Atlanta, GA [See: www.cdc.gov/ncbddd]

* North American Cartographic Information Society (NACIS XXII), October 9-12, 2002, Columbus OH [See: www.nacis.org]

* American Public Health Association (APHA) 130th Annual Meeting & Exposition: "Putting the Public Back into Public Health," November 9-13, 2002, Phil. PA [See: <http://www.apha.org/meetings/index.htm>]

* GeoHealth 2002: "Using Health Geoinformatics to Support Effective Decision-making", December 3-5, 2002, Wellington, New Zealand [See: <http://www.geohealth.org.nz>]

* First International Global Disaster Information Network (GDIN) Information Technology Exposition & Conference, October 9-11, 2000 Honolulu, HI [See: <http://www.erim-int.com/CONF/GDIN/gdin.html>]

* 8th Annual Maternal and Child Health Epidemiology Conference, sponsored by CDC's National Center for Chronic Disease Prevention and Health Promotion, December 11-13, 2002, Clearwater Beach, FL [See: http://www.cdc.gov/nccdphp/drh/02_mchepi.htm]

II. GIS News

(Please communicate directly with colleagues referenced below on any items; please note that the use of trade names and commercial sources that may appear in Public Health GIS News and Information is for identification only and does not imply endorsement by CDC or ATSDR)

A. General News and Training Opportunities

1. From **HHS Weekly Report**, (1):11, April 21-27, 2002 (**Secretary Thompson and ABC Radio to "Close the Health Gap"**): Secretary Thompson recently announced a partnership between HHS and the ABC Radio Networks to promote good health, especially targeted to African American audiences. Research shows the disparity among African-Americans: ***The average life expectancy for African-Americans is six years less than Caucasians; *Infant mortality rates for African-American children are twice as high as those for Caucasian infants; and *African Americans are twice as likely to die from diabetes than are Caucasians**. A desire to close this "health gap" is behind the national public health campaign launched last fall by Secretary Thompson and ABC Radio Networks. "Closing the Health Gap" will inform and educate African-Americans with a wide range of proven health messages, including lifestyle tips and information regarding clinics and public health programs. It combines the radio networks' broadcast resources with HHS's health information expertise, and will involve civic organizations and community groups across the country. "As a nation, we need to work aggressively to close this health gap," Secretary Thompson said. "Closing the Health Gap" will spread the word about good health and prevention directly to millions of African-American listeners." ABC Radio has turned HHS's scientific knowledge into effective radio programming. Detailed health messages are airing in 10-, 30- and 60-second public service announcements on 240 radio stations across the U.S. [Source: <http://www.hhs.gov/news/newsletter/weekly>]

2. From **Adena Schutzberg**, *GIS Monitor*: March 25, 2002- **Free Web-based Tool Makes Map Colors a Snap**. From my alma mater, Penn State, comes a Web tool to help find the right colors for thematic maps. Funded by a National Science Foundation Grant as part of the Digital Government Program, ColorBrewer provides a step-by-step process to examine different color schemes (see <http://www.colorbrewer.org>). Now, you might think that your GIS software can do this, too, and perhaps some can, but most simply make all sorts of options available, with little guidance about effective use. I was pleased that after picking the number of categories

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

3

(step 1), there was a help tool to explain sequential, diverging and qualitative schemes (step 2). I don't recall running into those in my study of cartography or in many years using GIS. Step three presents nine different mini-legends, that when selected, are applied to a sample map. You can add point symbols for cities and line symbols for roads to get the complete effect.

Now comes the really interesting part: each legend is rated for different uses including printing in black and white, LCD projection, and use by people who are color-blind, among others. You can then request the color values in CMYK (cyan, magenta, yellow, black), RGB (red, green, blue), ArcView and others. For now, you can only print the color scheme values, but soon you will be able to print them to a text file, or to XML. At this point you can't upload your maps to take advantage of the tool, which uses Flash. However, I could see how down the road this might be a useful on-line GIS service for map creation applications. Wondering about how they picked the name ColorBrewer? The lead investigator is Cindy Brewer, an associate professor in the Penn State Geography Department. Programming is by Mark Harrower, a PhD candidate in the department. [Contact: Adena, Editor, at aschutzberg@tenlinks.com]

3. From **Thomas Conry**, Fairfax County (VA): **URISA's** (Urban and Regional Information Systems Association) Program Committee invites you to submit abstracts in the following category for its upcoming, **40th anniversary conference**, October 26-30, in Chicago: **Public Health, Local Government and G/IS. Public Health has embraced G/IS as a key tool in its mission. The events since September 11 [2001] have highlighted the need for increased interaction and support for Public Health across government levels. Papers are being sought that can discuss *G/IS in Public Health: success stories and trends; *Public Health and Local Government: what connections exist with Public Health, what needs to be changed to improve the links?; *Public Health G/IS Policy Issues: what are key policy issues facing public health that local government officials need to address?; *Worldwide issues.** There are 8 other tracks: e-Government; Forty Years of Vision:

URISA in Hindsight; Data Integration: Data Standards, Policy Issues, Software Considerations; September 11-One Year Later; Enterprise Operations; Beyond Maps, Making Connections; and Other-Current and Hot Topics. For details on each track and submission material, see <http://www.urisa.org/2002AnnualConference/call.htm>. [Contact: Tom, GIS Manager, at thomas.conry@fairfax]

4. From **Michael Sherman**, Washington GIS Consortium (WGIS and registration at site <http://www.wgis.org>): The Washington GIS Consortium and the National Capital Planning Commission (NCP), in partnership with Proximity, is hosting a series of hands-on training classes focused on **using Census 2000 data with GIS tools**. While the content of the sessions make use of data for the Washington, D.C. metropolitan area, the concepts and applications of data and tools apply to any geographic area in the U.S. Through their affiliation with the Washington Geographic Information System Consortium, NCP and Proximity seek to provide unique learning opportunities. Classes are offered monthly and registration is available for Thursday, May 9 and Thursday, June 6. **The agenda includes: 1. Getting to Know Census 2000, •Overview and changes since 1990 Census, •New Census geography for Census 2000, • American FactFinder and Quick Facts; 2.What "SF 1" means to you • Overview of Summary Files, • What is included and what isn't in SF 1?, • What is a "data dictionary" for SF 1?; 3. Putting Census 2000 Demographics on Maps, •Adding SF1 data to ArcView 3.2, ArcGIS, •Why do I have to bother with numbers and colors?, •Mapping software/platform alternatives,•Important thematic maps related to planning; 4. Advanced topics in using Census data- •Adding Census data to MS Access and using ArcGIS, •Making graphs using MS Access and ArcGIS, •Making graphics using MS Access and Excel, •What's a TAZ, and how can it use Census data?,•Getting more data from Proximity.** [Contact: Rozanna Whitzett at roszonna.whitzett@ncpc.gov]

5. From **Andrew B. Lawson**, University of Aberdeen, UK (Announcing: **Disease Mapping and Risk**

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

4

Assessment for Public Health): A two day (June 5-6, 2002) course with a half day extension. This course is designed to provide an introduction to the area of disease mapping and risk assessment in applications to Public Health and Epidemiology. The two-day course consists of sessions dealing with: ***Basic concepts of disease mapping; *Disease cluster assessment; and *Risk assessment around health hazards**. The course will include theoretical input, but also practical elements and participants will be involved in a hands on tutorial with the DisMapWin and MapInfo mapping package. In addition, a review and demonstration of GIS tools for disease mapping will be provided (ArcGis and MapInfo). Participants will take part in a Case Study Scenario and have hands-on experience of a disease clustering problem. [Contact: Andrew, Department of Mathematical Sciences, at a.lawson@ maths.abdn.ac.uk]

B. Department of Health and Human Services

Agency for Healthcare Research and Quality

6. From **AHRQ Fact Sheet** "Addressing Racial and Ethnic Disparities in Health Care" (see <http://www.ahrq.gov/research/minorix.htm>). Access to Primary Care: Primary care is the underpinning of the health care system, and research studies have shown that having a usual source of care raises the chance that people receive adequate preventive care and other important health services. Data from AHRQ's Medical Expenditure Panel Survey (MEPS) reveal that: ***About 30 percent of Hispanic and 20 percent of black Americans lack a usual source of health care compared with less than 16 percent of whites; *Hispanic children are nearly three times as likely as non-Hispanic white children to have no usual source of health care; and African Americans and Hispanic Americans are far more likely to rely on hospitals or clinics for their usual source of care than are white Americans (16 and 13 percent, respectively, versus 8 percent).** **Diagnosis and Treatment.** Race and ethnicity influence a patient's chance of receiving many specific procedures and treatments. **Of nine hospital procedures investigated in one study, five were significantly less common among African American patients than among white patients; three of those five were also**

less common among Hispanics, and two were less common among Asian Americans.

Other AHRQ-supported studies have revealed additional disparities in patient care for various conditions and care settings including: **Heart disease. African Americans are 13 percent less likely to undergo coronary angioplasty and one-third less likely to undergo bypass surgery than are whites. Asthma. Among preschool children hospitalized for asthma, only 7 percent of black and 2 percent of Hispanic children, compared with 21 percent of white children, are prescribed routine medications to prevent future asthma-related hospitalizations. Breast cancer. The length of time between an abnormal screening mammogram and the followup diagnostic test to determine whether a woman has breast cancer is more than twice as long in Asian American, black, and Hispanic women as in white women. Human immunodeficiency virus (HIV) infection. African Americans with HIV infection are less likely to be on antiretroviral therapy, less likely to receive prophylaxis for *Pneumocystis pneumonia*, and less likely to be receiving protease inhibitors than other persons with HIV.** An HIV infection data coordinating center, now under development, will allow researchers to compare contemporary data on HIV care to examine whether disparities in care among groups are being addressed and to identify any new patterns in treatment that arise. **Nursing home care. Asian American, Hispanic, and African American residents of nursing homes are all far less likely than white residents to have sensory and communication aids, such as glasses and hearing aids. A new study of nursing home care is developing measures of disparities in this care setting and their relationship to quality of care.** Identifying that disparities in care exist is important, but it is not enough. Now, researchers are also beginning to focus on why these disparities exist, which disparities actually indicate poor-quality care, and how to develop strategies to address them.

Agency for Toxic Substances and Disease Registry

7. **William D. Henriques**, Geographic Information

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

5

Systems (GIS) Coordinator, ATSDR, gave GIS presentations at Emory University, "**Introduction to Mapping Technology for Public Health**", and Tulane University, "**Mapping Applications for Bioterrorism Preparedness and Response**". Bill also spoke at the ESRI Federal Users Conference on the use of TRI data in preparedness. The Emory program was sponsored by CDC, the Rollins School of Public Health of Emory University, the Emory University School of Medicine and the Nell Hodgson Woodruff School of Nursing of Emory University. The Tulane program was sponsored by the Center for Applied Environmental Public Health at their School of Public Health and Tropical Medicine. [Contact: Bill at wdh2 @cdc.gov]

8. From **Robert C. Williams**, Director, Division of Health Assessment and Consultation (Report Released): "**Historical Reconstruction of the Water-Distribution System Serving the Dover Township Area, New Jersey, January 1962–December 1996** (Summary of Findings). **This report concludes the exposure assessment aspect of the childhood cancer cluster investigation in Dover Township, Ocean County, NJ.** This epidemiologic study is a collaborative effort between the New Jersey Department of Health and Senior Services (NJDHSS) and ATSDR. This final report contains two volumes, (over 600 pages of text and appendices with one of the volumes being 151 maps, all of which were created and generated using ArcView GIS (see www.atsdr.cdc.gov). [Editor: The Forward to the report is reproduced in this edition, Section IV; the report contact and lead author is **Morris Maslia** at mmaslia@cdc.gov]

9. From **Bob Kay**, ATSDR: I have an interest in incorporating SAS/GIS into my SAS statistical analyses. Some helpful SAS/GIS tutorials may be found at <http://www.sas.com/service/edu/courses/tutorials.html>. In addition to walking you through on how to apply the software, the site provides a lot of information on the software and hardware requirements and its capabilities. Based on the tutorial, the SAS/GIS software requirements are: "Base SAS, SAS/FSP, and SAS/GRAPH software must be installed in order to use

SAS/GIS software. Other products may also be required, depending on the application" [Contact: Bob at rlk1@cdc.gov]

Centers for Disease Control and Prevention

10. Early Notice: **2003 CDC and ATSDR Symposium on Statistical Methods: Study Design and Decision Making in Public Health.** Statisticians, epidemiologists, and all other professionals with an interest in the application of statistics to public health are invited to participate in the 9th biennial Symposium on Statistical Methods, sponsored by the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR), to be held January 28-29, 2003, in Atlanta, Georgia. The theme for the Symposium is "Study Design and Decision Making in Public Health." A short course on a related topic will be offered on January 27, 2003, in conjunction with the Symposium. To request registration and abstract information and forms, or for additional information regarding the scientific content of the Symposium, please visit the Symposium web site at <http://www.cdc.gov/od/ads/sag>. [Contacts: Ram Jain (404)639-8867 or Betsy Cadwell (404)639-8693]

11. **Racial and Ethnic Disparities in Infant Mortality Rates-60 Largest U.S. Cities, 1995-1998:** From CDC's *MMWR* Weekly Report, April 19, 2002, 51(15) at site <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5115a4.htm>. During the 20th century, U.S. infant mortality rates (IMRs) declined by 90%; however, many of the largest U.S. cities continue to have high IMRs compared with national rates. Studies of U.S. infant mortality by region document persisting geographic disparities and differences across racial/ethnic groups. This report highlights the wide disparities in the most recent overall race- and ethnicity-specific IMRs for the largest U.S. cities and describes key differences among those cities. The findings demonstrate the need to decrease infant mortality among blacks in U.S. cities.

IMRs (number of infant deaths per 1,000 live births) were calculated by using the National Center for Health Statistics' Perinatal Mortality Data for 1995-1998. The numbers of infant deaths were obtained from linked birth- and death-certificate files, and the numbers of live

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

6

births were obtained from corresponding birth-certificate files. Rates were based on the mother's race, ethnicity, and city of residence at time of birth by using Federal Information Processing Standards place-of-residence codes as units of analysis.

12. From **David Fleming**, Deputy Director for Science and Public Health, OD: The **3rd National Electronic Disease Surveillance System Stakeholders Meeting** May 8-10, 2002 will provide a timely opportunity for discussions about how NEDSS can support bioterrorism preparedness and response, the relationship between NEDSS and other electronic health and public health efforts, and future directions for NEDSS. There will be opportunities to learn about specific state progress in implementing NEDSS compatible systems, and demonstrations of the NEDSS Base System, a NEDSS compatible solution currently in pilot testing in Nebraska and Tennessee and deploying to at least 20 states in 2002. Therefore the Centers for Disease Control and Prevention (CDC) and its Partners, the Association of Public Health Laboratories (APHL), the Association of State and Territorial Health Officials (ASTHO), the Council of State and Territorial Epidemiologists (CSTE), the National Association of County and City Health Officials (NACCHO), the National Association of Health Data Organizations (NAHDO), and the National Association for Public Health Statistics and Information Systems (NAPHSIS), are pleased to invite you (or your organization to send a representative) to participate in the 3rd National Electronic Disease Surveillance System (NEDSS) Stakeholders Meeting. [See: <http://www.cdc.gov/nedss>]

13. From **Iris Shimizu**, National Center for Health Statistics: Mary Christman, College of Agricultural and Natural Resources, University of Maryland presented a study entitled **“Predicting the Areal Extent of A Spatial Hotspot,”** on March 21 at College Park. This topic may have interest to other Public Health GIS Users. **Abstract:** Consider a continuous random spatial process over a two-dimensional region D . We define a hotspot in this region to be the area where the value of the process falls outside of some interval; for example, a hotspot

might be that area where k is a constant. The area of interest then is A . We explore estimating A under different models for the random process including classical linear regression models and spatial models with covariates. We derive the mean and variance of the proposed estimator and propose some simple criteria for comparing the different methods. An application based on dissolved oxygen levels in the bottom waters of the Chesapeake Bay demonstrates the approach [Contact: Sebastian Massimini at svm@mitre.org]

14. From **Betty Smith**, Division of Vital Statistics: The release date for provisional data on Births, deaths, marriages, and divorces which was published in ***Births, Marriages, Divorces, and Deaths: Provisional Data for August 2001*** was March 27, 2002. The data became available to the general public at that time. Tables showing provisional data by State are also available from the NCHS home page on the Internet at <http://www.cdc.gov/nchs/about/major/dvs/mortdata.htm>. [Contact: Betty at bls4@cdc.gov]

15. From **Robert Hill**, NCHS: The Division of Health Interview Statistics announces the **final** release of the **2000 National Health Interview Survey (NHIS)** public use data and supporting documentation. To view or download any files from this release, please visit the hotlinks "Final 2000 Data Release" or "2000 NHIS" at the NHIS Internet site at <http://www.cdc.gov/nchs/nhis.htm>. To identify revisions between the December, 2001 provisional release and this release, visit the hotlink "Notices for Data Users" within the 2000 NHIS hotlink collection at the NHIS Internet site. [Contact: Robert, Systems and Programming Branch, at zhl5@cdc.gov]

16. **Charles Croner** lectured at Cornell University's Department of Policy Analysis and Management (DPAM), on March 28, 2002. The presentations were entitled **“Geographic Information Systems (GIS): Exciting New Approaches to Disease Surveillance and Prevention”** and **“Exploring Space-Time Relationships with GIS.”** The program was sponsored by NCHS in cooperation with Eunice Rodriguez, Associate Professor, DPAM. [Chuck at cmc2@cdc.gov]

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

7

Health Resources and Services Administration

17. From *HRSA News*, February 27, 2002. **HRSA Awards Extra \$9 Million to Reduce Infant Mortality in 12 Communities: Increase In Healthy Start Funding Makes Additional Awards Possible.** The Health Resources and Services Administration (HRSA) today announced Healthy Start grants totaling \$9 million for communities in 10 states and Puerto Rico. The new awards will support 12 current and former Healthy Start grantees whose applications were approved in FY 2001 competition for Eliminating Disparities in Perinatal Health grants but were not funded due to insufficient resources. The four-year grants will support community-driven approaches to cut infant mortality rates by reducing behavioral and medical risk factors and promoting healthy outcomes for young women and their families. Grantees include: Arizona Health Care Cost Containment System, Phoenix AZ; Northwest Indiana Health Department, Hammond IN; Whitley County Health Department, Williamsburg KY; Baltimore City Health Department, Baltimore MD; New Jersey Department of Health and Senior Services, Trenton NJ; Perinatal Network of Monroe County Inc., Rochester NY; The University of North Carolina at Pembroke, Pembroke NC; North Carolina Department of Health and Human Services, Raleigh NC; Puerto Rico Department of Health, San Juan PR; Pee Dee Healthy Start Inc., Florence SC; Aberdeen Area Tribal Chairman's Health Board, Aberdeen SD; and Virginia Department of Health, Richmond VA. [See: <http://www.mchb.hrsa.gov>]

National Institutes of Health

18. From **Suzanne Heurtin-Roberts**, National Cancer Institute (NIH): **Harvard researchers find racial disparities in quality of care.** Black Medicare HMO patients receive lower quality medical care than their white counterparts, according to a new Harvard University study that is one of the largest analyses of disparities in medical care to date. In the study, published in today's *JAMA* (March 13, 2002), researchers found disparities "where they least expected," *Newsday* reports. The most striking difference was found in psychiatric care, though blacks also received poorer diabetes-related eye care, fewer beta-blockers, and a lower rate of breast cancer screening (Ricks, 3/13). Lead researcher Dr. Eric

Schneider and colleagues studied 1997 medical data for 305,000 Medicare patients aged 65 and over with supplemental MCO coverage. According to Schneider, previous research has suggested that blacks in managed care plans enjoy better access than blacks in indemnity plans. This notion prompted Schneider to hypothesize that MCOs provide equal care to both races, but his research instead determined that racial disparities exist in several areas:

-About 33% of blacks received follow-up care after hospitalization for mental illness, compared with 54% of whites;

-Nearly 44% of black diabetics received eye exams, compared with over 50% of whites;

-About 64% of blacks received beta-blockers to lower heart rate following myocardial infarction, compared with nearly 74% of whites;

-Nearly 63% of black women were screened for breast cancer, compared with almost 71% of whites (Schneider et al, *JAMA*, 3/13). The authors note that the disparities in breast cancer screening may be attributed to factors other than race, such as enrollment in health plans that don't emphasize preventive screenings.

According to *Newsday*, Dr. Richard Payne, chief of pain management and palliative services at **Memorial Sloan-Kettering Cancer Center**, has found similar racial disparities in care. He notes that his facility has teamed with **Harlem Hospital** to help address this problem and develop the best ways to treat all cancer patients (3/13). [Contact: Suzanne, Division of Cancer Control and Population Sciences, at sheurtin@mail.nih.gov]

Substance Abuse and

Mental Health Services Administration

19. The **DASIS Report: Black Admissions to Substance Abuse Treatment, 1999** (available March 1, 2002) shows that alcohol or cocaine abuse accounted for almost two thirds of the 366,000 Black treatment admissions. **•black female admissions were more likely to involve treatment for "hard" drugs (e.g., opiates and cocaine) than were Black male admissions; and •from 1994 to 1999, Black admissions to substance abuse treatment decreased**

PUBLIC HEALTH GIS NEWS AND INFORMATION

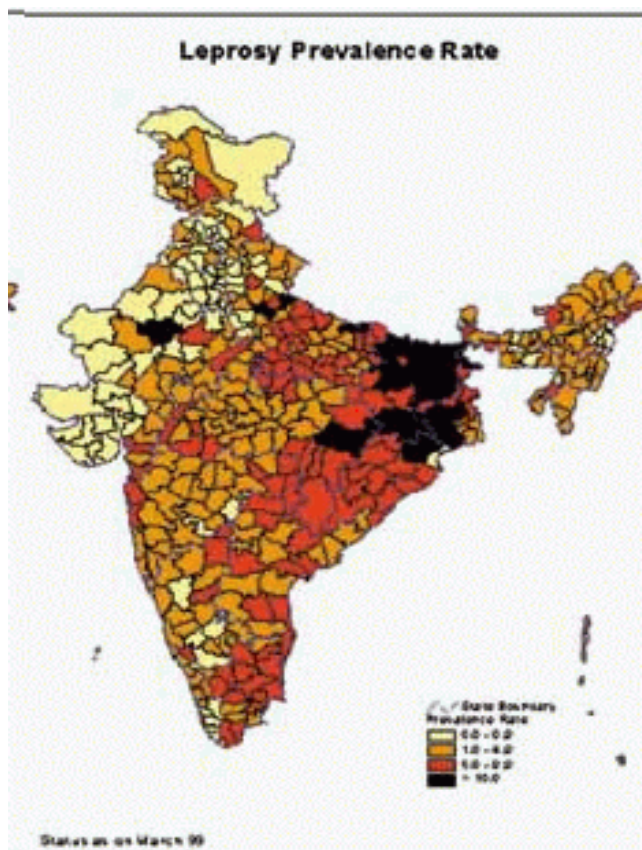
May 2002 (No. 46)

8

by 15 percent. This Short Report (see <http://www.samhsa.gov/oas/newpubs.htm>) is based on the Drug and Alcohol Services Information System (DASIS), the primary source of national data on substance abuse treatment. DASIS is conducted by the Office of Applied Studies (OAS) in the Substance Abuse and Mental Health Services Administration (SAMHSA).

C. Historical Black Colleges and Universities (HBCUs) and Other Minority Program Activities

20. **Health GIS in India.** With most of the international development funding and focus



oriented towards health care systems, it is the best time and opportunity to develop a comprehensive and structured health GIS for the entire country [see: site <http://www.gisdevelopment.net/application/health/overview/health0004.htm>. Medical geography is relatively a new concept in India. Though GIS is being used to deliver a pizza on time, its immense applicability in delivering health care services is yet to be explored

fully. The sheer size of our country, varied life styles, climatic zones and environmental conditions (all of which have a direct impact on health and ill-health) make it all the more important for India to have a health GIS. With most of the international development funding and focus oriented towards improving health care systems, this is, if not too late, the best opportunity and time to develop a comprehensive and structured health GIS for the entire country. In this article the authors make an attempt to share their views and experiences in developing a health GIS for Leprosy and TB mapping in the states of Madhya Pradesh, Orissa and Tamil Nadu. [Contact: Dr. Peters, Chief Adviser DANIDA and lead author, at bou@danlep.com]

21. See **FGDC Tribal Working Group Charter**, this edition, Section V.

D. Other Related Agency or Business GIS News

22. From **William C. Hoffman**, Public Health Research Laboratories: Public Health Research Laboratories (PHRL) presents the following GIS training courses for health researchers. These training courses are designed to provide researchers an essential understanding of the following disciplines for the prevention and control of disease: Medical geography, Spatial Analysis, Spatial Statistics, Spatial Modeling, and Spatial Epidemiology. For more information see <http://www.phrl.org/Special%20Training%20TBA.htm>, to be held June 17-28, 2002, University of California, Berkeley-Geographic Information Science Center (GISC). PHRL is available to provide training onsite.[Contact: Bill at whoffman@phrl.org]

23. From **Ric Skinner** Baystate Medical Center, Springfield, MA: For those of you attending the 2002 ESRI User Conference you may be interested in knowing about a **"GIS in a Hospital Environment"** Special Interest Group meeting, to be held July 9, 2002, immediately following the Health & Human Services User Group Meeting. This Hospital GIS SIG will be informative (perhaps enlightening!) for us "hospital geographics types" to get together to share what's being done with GIS in the hospital environment, discuss obstacles and opportunities for GIS in the hospital organization, and consider what we need to do to better

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

9

integrate GIS into the day-to-day operations and decision making. The results of a survey will be presented and discussed. If you want to be sure you're included in the survey please send an email to me. [Contact: Ric, GIS Coordinator, at ric.skinner @bhs.org]

24. From **Dunrie Greiling**, TerraSeer: TerraSeer announces a new **Educational Initiative**, designed to promote multi-disciplinary research use of its latest spatial analysis technology (see site <http://www.terraseer.com>). This Educational Initiative provides lenient pricing terms to academic and government researchers as well as non-profit entities for single permanent license of BoundarySeer, ClusterSeer or SpaceStat. Each license comes with 3 months of software support. BoundarySeer is software for edge detection and geographic boundary analysis, ClusterSeer locates and evaluates disease clusters in space, time, and space and time, and SpaceStat provides methods for spatial econometric modeling and prediction. [Contact: Dunrie at dunrie@terraseer.com]

25. From the **Open GIS Consortium, Inc.**: Request for Quotation (RFQ), Released-October 24, 2001, Due-November 21, 2001. The **Multihazard Mapping Initiative, Phase 1 (MMI-1)**, sponsored by the US Federal Emergency Management Agency (FEMA), will establish a standards-based framework of interoperable services to illustrate the advantages of using products with OGC interfaces to access, fuse and visualize critical spatial information in support of FEMA multi-hazard mitigation, response and recovery functions. The Multi-hazard Mapping Initiative is a multi-phase initiative mandated by section 203 (k) of the Disaster Mitigation Act of 2000. That statute requires that FEMA develop the initiative in conjunction with state and local governments and the appropriate Federal agencies (see <http://ip.opengis.org/mmi/index.html>).

A multihazard advisory map is a map on which hazard data (flood, hurricane, severe winds, and seismic) is identified showing areas of overlap. These maps will be made available to the appropriate State and local governments for informing the general public about hazards and to support activities for mitigation purposes and other public uses. FEMA recognizes the critical need

for standards-based frameworks to support multihazard advisory map publishing, dissemination and integration efforts. By implementing interoperable services based on OGC interfaces, FEMA will be able to operationally demonstrate an interoperable framework for publishing, finding and accessing hazard advisory maps from multiple sources and displaying them in a common environment.

III. GIS Outreach

[Editor: All requests for Public Health GIS User Group assistance are welcomed; readers are encouraged to respond directly to colleagues]

F From **Jim Thomas**, Maryland Department of Health and Mental Hygiene: I am making a business case for implementing an **Integrated GIS** at our health department. The department has made progress towards this goal but the necessary funding support is still is yet to come. My presentation will focus on GIS relative to cost savings. Any information that other Public Health GIS Users could share on the cost saving benefits of implementing an integrated GIS would be extremely useful. [Contact: Jim, GIS Project Manager, at voice (410) 767-5106 or email JCThomas@dnhm.state.md.us; Editor: Jim's efforts to date have been excellent to make this a reality. Your help will be much appreciated. I would like to include some of the GIS cost savings examples you may have in a future edition]

F From **Penny Anderson**, Palm Beach County, FL: I am working with a collaboration of agencies to share Health, Human Services and Education data via a GIS web application. Are you aware of any guidelines or standards dealing with **"improved methods for accessing and sharing human health databases while safeguarding against personal and confidential disclosure."** As a group we would like to adopt standards and guidelines pertaining to these issues and if there is something already established we could review, it would be very helpful. Your assistance in this matter is greatly appreciated. [Contact: Penny, Countywide GIS Coordination, at Penny Anderson Panderso@co.palm-beach.fl.us]

F From **Karen Olson**, Children's Hospital, Boston MA: I'm interested in topics such as **hot spot analysis**, not for crime applications, but for public health surveillance. I

just geocoded 50K addresses from a hospital database with two GIS packages (ArcGIS, SAS/GIS). Now I want to read more of the geocoding literature. Where can I find it? Any favorite articles, particularly regarding assessing accuracy? [Contact: Karen at karen.olson@tch.harvard.edu]

IV. Public Health GIS Presentations and Literature

NCHS Cartography and GIS Guest Lecture Series June 12, 2002. "NASA Geospatial Science, Technology and Data for Public Health," by **Robert A. Venezia**, Dr.PH, Program Manager for Public Health Applications, NASA Earth Science Enterprise and **Louisa R. Beck**, Ph.D., Remote Sensing Scientist, Center for Health Applications of Aerospace Related Technologies, NASA Ames Research Center, from 2:00-3:30PM, NCHS Auditorium. **Abstract:** Since the mid-1970s, NASA researchers have successfully used remotely sensed Earth observations to improve our understanding of public health problems associated with air quality, infectious disease vectors, ultra-violet radiation, and water quality as well as climate change, extreme weather, and natural disasters. NASA's ability to measure and monitor changes in land cover, rainfall, soil moisture, solar radiation, temperature, vegetation, and wind, among many other factors have proven useful in research studies and response activities. To focus these capabilities, NASA maintains two programs dedicated specifically to addressing public health-related issues using its geospatial technologies and data, advanced communications architectures, and high speed computing assets. The Center for Health Applications of Aerospace-Related Technologies at NASA's Ames Research Center works with U.S. and international public health researchers to expand the use of remote sensing and Geographic Information System technologies through training, education, applications projects, and direct transfer of technology. *Healthy Planet*, a program at NASA's Goddard Space Flight Center in Maryland, demonstrates to potential users how to access and incorporate Earth science remote sensing data and technology for environmental health research.

NASA researchers believe that Earth science and remote sensing-derived data offer tools that the

public health community would find useful for investigating and responding to health risks attributable to environmental factors. NASA is poised to help meet the health objectives of the Nation with the guidance and collaboration of those Federal agencies responsible for our Nation's health. NASA's recent strategic planning efforts for public health applications emphasize an inter-agency dialogue with the Centers for Disease Control and Prevention, the National Institutes of Health, and the Environmental Protection Agency as the primary research and regulatory units of the Federal Government with responsibility for environmental health-related issues and activities. This talk will outline NASA's capabilities within the field of human health, and offer a vision for productive collaboration with its sister agencies. [Contact: Bob at rvenezia@hq.nasa.gov]

CDC Emerging Infectious Diseases and MMWR Emerging Infectious Diseases

Emerging Infectious Diseases is indexed in Index Medicus/Medline, Current Contents, Exerpta Medica, and other databases. Emerging Infectious Diseases is part of CDC's plan for combating emerging infectious diseases; one of the main goals of CDC's plan is to enhance communication of public health information about emerging diseases so that prevention measures can be implemented without delay. The **May 2002** edition of CDC's journal, *Emerging Infectious Diseases* (EID), is currently available at the CDC web site <http://www.cdc.gov/ncidod/EID/index.htm>. This issue contains articles with potential relationships to GIS applications including- Hemorrhagic Fever, Encephalitis, and Hepatitis, Cambodia; Urban Canine Rabies, Bolivia, 1972-1997; and Exposure to Bat Rabies Among U.S. Cavers. In addition, several articles of possible interest from Vol. 8, No 6, **June 2002** are online including Three Cryptosporidiosis Outbreaks, Northern Ireland, and African Trypanosomiasis in Travelers to Tanzania.

Morbidity and Mortality Weekly Report

Selected articles from CDC's ***Morbidity and Mortality Weekly Report*** (MMWR): [Readers may subscribe to MMWR and other CDC reports, without cost, at <http://www.cdc.gov/subscribe.html> and access the

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

11

MMWR online at <http://www.cdc.gov/mmwr>]: Vol. **51**, No. **16**- Respiratory Illness in Workers Exposed to Metalworking Fluid Contaminated with Nontuberculous Mycobacteria-Ohio, 2001; Notice to Readers: Smallpox: What Every Clinician Should Know-A Self-Study Course; Notice to Readers: Introduction to Public Health Surveillance; *Recommendations and Reports*, Vol. **51**, No. **RR-4**- *Guidelines for School Programs To Prevent Skin Cancer* Vol. **51**, No. **15**- Preliminary FoodNet Data on the Incidence of Foodborne Illnesses-Selected Sites, United States, 2001; Racial and Ethnic Disparities in Infant Mortality Rates-60 Largest U.S. Cities, 1995-1998; Notice to Readers: CDC's Campaign to Prevent Antimicrobial Resistance in Health-Care Settings; Vol. **51**, No. **14**- Annual Smoking-Attributable Mortality, Years of Potential Life Lost, and Economic Costs-United States, 1995-1999; Notice to Readers: Epidemiology in Action; Notice to Readers: Epi Info 2000: A Course for Developers of Public Health Information Systems; Vol. **51**, No. **13**- Alcohol Use Among Women of Childbearing Age-United States, 1991-1999; Imported Dengue-United States, 1999 and 2000; Vol. **51**, No. **12**- Progress Toward Global Eradication of Poliomyelitis, 2001 Surveillance Summaries; Vol. **51**, No. **SS-1**- Surveillance for Asthma-United States, 1980-1999; Malaria Surveillance-United States, 1999; Vol. **51**, No. **8**- Health-Related Quality of Life-Puerto Rico, 1996-2000.

Other Literature: *Special Reports* **Are We Making Our Children Sick?** **Kids And Chemicals**

[A Special Report on NOW with Bill Moyers- Tracks The Scientific Search for Answers about How Environmental Toxins Affect America's Children (Premieres Friday, **May 10** at 9:00 (ET) on PBS, check local listings) It is a medical mystery marked "urgent." Across America growing numbers of children are suffering from asthma, childhood cancers like leukemia, as well as learning and behavioral disabilities. Scientists are searching for clues to the causes of these illnesses, and a growing body of research suggests that everyday environmental toxins-what kids eat, drink, and breathe-may put them at risk. Equipped with new technology and

more sophisticated analysis, these scientists are asking compelling questions about the health risks to children growing up exposed to an ever-increasing number of untested chemicals in our environment.

Kids and Chemicals, a special edition of NOW with Bill Moyers to be broadcast on PBS, Friday, May 10 at 9 p.m. (ET), features medical investigators and health officials engaged in the latest research on links between childhood illness and environmental contamination. The program looks at families around the country who are coping with the consequences to their children of potentially toxic exposures. "The disturbing increases in childhood illness in America cannot be ignored," says Bill Moyers. "How does the exposure affect children's health? The new research is studying how chemicals enter the human body, and posing questions that they could never ask before: Do chemicals affect children, babies and unborn fetuses more than adults? What factors increase toxicity, and how can we protect children from harm?"

Kids and Chemicals' producers Gail Ablow and Greg Henry go to Fallon, Nevada, a small desert town that has had 15 recorded cases of childhood leukemia in just five years. Alarmed, Dr. Mary Guinan, who was one of Nevada's top health officials, called in the Centers for Disease Control and Prevention to investigate the potential links between this childhood cancer and the environment. Could toxic substances in water, food, air, schools, homes or the ground in Fallon be responsible for this "cancer cluster"? If so, which chemicals? Without clear evidence of a specific cause, everything-from jet fuel emissions to pesticides to naturally occurring arsenic in the water-is suspect.

As Moyers and his team learn in Fallon, research on cancer clusters once focused mainly on gathering environmental samples because investigators simply didn't have tools sensitive enough to measure which toxins had been absorbed into people. Dr. Richard Jackson, the director of the National Center for Environmental Health at the Centers for Disease Control and Prevention, explains how his laboratories are using the latest instruments. His research scientists are using sophisticated blood and urine analysis to test for minute traces of toxins in the bodies of the sick children and their families in Fallon.

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

12

This work is part of a larger movement in children's environmental health unfolding nationwide. Dr. Phillip Landrigan of the Mount Sinai School of Medicine in New York City works with scientists around the country to understand how kids are affected by exposure to chemicals. "Of the 3000 high production volume chemicals in use in this country today, only 43% have been even minimally tested," he tells Moyers. "Only about 10% have been thoroughly tested to examine their potential effects on children's health and development."

Speaking with Landrigan, Moyers learns that children are potentially more vulnerable to chemicals than adults. "First of all they're more heavily exposed pound for pound," says Landrigan. "They eat more food, they drink more water, they breathe more air. Then, of course, kids play on the ground. They live low, they put their hands in their mouth and so they transfer more toxic chemicals into their body than we do."

Traveling to Research Triangle Park, North Carolina, Moyers meets Dr. Linda Sheldon of the Environmental Protection Agency's National Exposure Research Lab. Sheldon demonstrates how her team of scientists is gathering evidence of exposure to everyday chemicals in nursery schools, homes and daycare centers. In New York City, a groundbreaking study led by Dr. Frederica Perera at Columbia University's Mailman School of Public Health, follows more than 500 expectant mothers. These women are wearing air quality monitors in backpacks to trap the environmental toxins they breathe. As their children are born and as they grow, Dr. Perera and her team will look for links between the chemicals that the mothers were exposed to while their babies were developing in the womb and asthma, cancer risk, and learning disabilities.

Dr. Sandra Steingraber, a biologist at Cornell University, joins Dr. Landrigan in asserting that exposure during pregnancy doesn't, by itself, mean a child will get ill. What matters is the intensity of the exposure and when it occurs during fetal development. A chemical exposure occurring early in pregnancy might cause a miscarriage, argue the researchers. If it occurs later on, it might cause physical birth defects. Later still, it might damage brain cells. Scientists are trying to precisely identify these "windows of vulnerability." Says Dr. Steingraber: "Maybe certain problems that we

understand . . . as attention deficit disorders, hyperactivity, the inability to pay attention, aggressive and violent behaviors, might have their origins during those windows of vulnerability during pregnancy and these questions are just being asked. Data is just beginning to come in."

Dr. Perera's team at Columbia is also studying the way that chemicals can actually bind to human DNA in the womb and cause a mutation called an "adduct." Work by Dr. Perera has shown that the greater the number of adducts, the greater the risk for cancer. "And that's the missing link in all of this," says Dr. Steingraber. "That's the link we're beginning to fill in."

To place the current studies in a public health policy context, Moyers revisits the firestorm over lead research; recalling the revolutionary work of Dr. Herbert Needleman, who correlated low-level lead exposure to lower IQ's in children in 1979. Twelve years later, Needleman's work was attacked by the lead industry as it tried to protect its economic stake in lead products. Ultimately, the validity of Dr. Needleman's work was fully vindicated, and new public policy required unleaded gasoline and restrictions on lead paint. And many scientists believe that, as a result, children's IQ scores have risen, on average, three points. Yet, as Moyers points out, lead remains the number one environmental threat to children's health; many old houses and even many school buildings are still testing positive for lead today.

In Herculaneum, Missouri, lead contamination is a very current issue. The community is up in arms about the astonishingly high levels of lead to which their families have been exposed because the town's primary industry, the Doe Run lead smelter, failed to comply with EPA standards. "Doe Run played a really good game," Robyn Warden, a mother, tells Moyers. "They told people everything was under control and we were safe. And people weren't educated enough to know any different. It took people actually investigating lead to figure out that we were being lied to."

Dr. Steingraber knows the importance of informed parenting. Even in a seemingly pristine environment in rural New York, she knows there are possibilities of risk. "Just because there are no smoke stacks visible around us, just because you live a long way

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

13

from the source of these chemicals, doesn't mean that nature won't bring them to you in some way," she says. A mother who breast feeds her infant son, Dr. Steingraber also realizes that she passes toxins directly to her baby every time she nurses. "No woman has uncontaminated breast milk on this planet," she states. Dr. Steingraber tries to reduce her children's exposure at home by using non-toxic products. "But we can't shop our way out of our current situation," she warns. "We still need to take action. It's time that our public policy takes action to get our kids out of harm's way."

There are unknown answers to many questions. Moyers reports on a proposed new project called "The National Children's Study," which will track 100,000 children from the womb to age 18 if it receives full funding from Congress. This long-term study may provide the definitive answers necessary for new regulations and laws protecting children from exposure to toxins. "Without conclusive science," Moyers says, "it is a constant fight to protect children's health." [Find out more about how scientists are studying environmental toxins and join the ongoing discussion about the critical issues covered in NOW online at www.PBS.org/now. Press Contact: Adina Barnett, Kelly & Salerno Communications, at adina@kellysalerno.com; also contact Mary Miller at marymiller@inwa.net]

National Research Council

Planning for Catastrophe: a Blueprint for Improving Geospatial Data, Tools, and Infrastructure [Draft Proposal]

SCOPE: Geospatial information plays a vital role in all aspects of emergency management (e.g., detection, preparedness, prevention, protection, response, and recovery). Sound decision making during emergencies requires the rapid integration of complete and accurate data that drive user-friendly decision-support tools. Centered on a workshop, this study will assess the status of and needed improvements in geospatial tools, data, and infrastructure for enhancing decision-making in emergency situations. Specifically, the study will: (1) assess the value of geospatial tools in disaster planning and disaster response; (2) identify the status of and needs for decision-support tools for mapping vulnerability to catastrophe, scenario testing, disaster planning, and

logistical support; (3) identify the mission-critical data requirements for effective decision-making; (4) examine technical and institutional mechanisms that enable rapid discovery, access, and assemblage of data from diverse sources; (5) assess training needs for developers and users of spatial decision-support systems; and (6) examine potential conflicts between issues of security and the need for open access to data. The overall goal of the study is to develop a blueprint for enhancing the utilization of geospatial tools for protecting lives and property during catastrophic events. Origin: Self-initiated study by the Committee on Geography, and the Mapping Science Committee; Keywords: Decision support system, disaster preparedness, disaster response, evacuation, vulnerability; Duration: 16 months (plus 2 for dissemination). **Prior NRC Work:** **Toward a Coordinated Spatial Data Infrastructure for the Nation (MSC, 1993); Promoting the National Spatial Data Infrastructure Through Partnerships (MSC, 1994); A Data Foundation for the National Spatial Data Infrastructure (MSC, 1995); The Future of Spatial Data and Society: Summary of a Workshop (MSC, 1997); Distributed Geolibraries: Spatial Information Resources. (MSC, 1999); National Spatial Data Infrastructure Partnership Programs: Rethinking the Focus (MSC, 2001).** [Contact: **Paul Cutler** at (202) 334-2744 or email pcutler@nas.edu]

Historical Reconstruction of the Water-Distribution System Serving the Dover Township Area, New Jersey, January 1962–December 1996

FOREWORD

The New Jersey Department of Health and Senior Services (NJDHSS), with support from the Agency for Toxic Substances and Disease Registry (ATSDR), is conducting an **epidemiologic study of childhood cancers** in Dover Township, Ocean County, New Jersey. In 1996, ATSDR and NJDHSS developed a Public Health Response Plan in cooperation with the Ocean County Health Department and the Citizens' Action Committee on Childhood Cancer Cluster. The plan outlines a series of public health activities including assessments of potential environmental exposures in the

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

14

community. In 1997, ATSDR and NJDHSS determined that an epidemiologic study was warranted, and that the study would include assessments of the potential for exposure to specific drinking-water sources.

To assist the epidemiologic efforts, ATSDR developed a work plan to reconstruct historical characteristics of the water-distribution system serving the Dover Township area by using water-distribution system modeling techniques. The numerical model chosen for this effort, EPANET 2, is available in the public domain and is described in the scientific literature. To test the reliability of model simulations, water-distribution system data specific to the Dover Township area were needed to compare with model results. Lacking such data, a field-data collection effort was initiated to obtain pressure measurements, storage-tank water levels, and system operation schedules (the on-and-off cycling of wells and pumps) during winter-demand (March 1998) and peak-demand (August 1998) operating conditions. Using these data, the water-distribution system model was calibrated to present-day (1998) conditions. ATSDR released a report and a technical paper in June 2000 describing the field-data collection activities and model calibration results.

Having established the reliability of the model and the modeling approach, the model was used to examine (or reconstruct) historical characteristics of the water distribution system. For this purpose, monthly simulations were conducted from January 1962 through December 1996 to estimate the proportionate contribution of water from points of entry (well or well fields) to various locations throughout the Dover Township area.

This summary of findings was developed to provide an overview of the historical reconstruction analysis conducted by ATSDR and NJDHSS. A full description of the analysis is forthcoming in a comprehensive report. For the historical period, the following topics are presented in the full report: (1) data sources and requirements, (2) methods of analysis, (3) simulation approaches, (4) selected simulation results of the historical reconstruction analysis, and (5) the use of sensitivity analysis to address issues of uncertainty and variability of historical system operations. [Readers interested in details of the historical reconstruction

methodology, simulation approaches, or results for specific years and locations for the Dover Township area should refer to the full report that is available at the ATSDR Web site at www.atsdr.cdc.gov]

Combining Environmental Data Using Bayesian Hierarchical Space-Time Models

National Center for Environmental Research, Science to Achieve Results (STAR) Program, Investigators **Dale Zimmerman** and **Mary Kathryn Cowles**, The University of Iowa, EPA Project Officer: Nigel Fields, Project Period: January 1, 1999-December 31, 2001, Research Category: Environmental Statistics (EPA Grant Number: R826887). **Objectives/Hypothesis:** Environmental data often come from multiple, disparate sources or consist of subsets which are collected under markedly different conditions in space or time. To obtain the most informative conclusions from the data, it is preferable (and sometimes necessary) to base a statistical analysis upon the combined data from all these sources or subsets. Some specific examples include: grafting environmental time series from different measurement systems to better detect long-term trends; streamflow record reconstruction at a previously ungauged station; and combining data from monitoring networks operated by two different organizations for the purpose of improved prediction of the underlying processes) at unsampled sites and times. The primary objectives of this research are to build useful models for combined environmental space-time data and to develop sound, easy-to-use methods for fitting those models and using them for estimation, prediction, and other inferences regarding the underlying space-time processes).

Approach: We shall develop general, flexible **Bayesian hierarchical models** suitable for combined space-time data. The models will accommodate spatial and temporal dependence at several scales and non-trivial spatio-temporal interaction. Furthermore, they will be able to deal with the lack of rectangularity in the combined data. We shall fit these models using **Markov Chain Monte Carlo (MCMC) methods**, treating missing values which arise from 19 combining the data as additional quantities to be estimated. High dimensionality,

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

15

high correlation among model parameters, and increased uncertainty introduced by missing data all contribute to slow convergence of the MCMC sampler. Consequently, we will investigate several strategies for assessing and accelerating convergence. Model performance and the merits of combining the data will be investigated by simulation. We will make computer code for fitting our models publicly available.

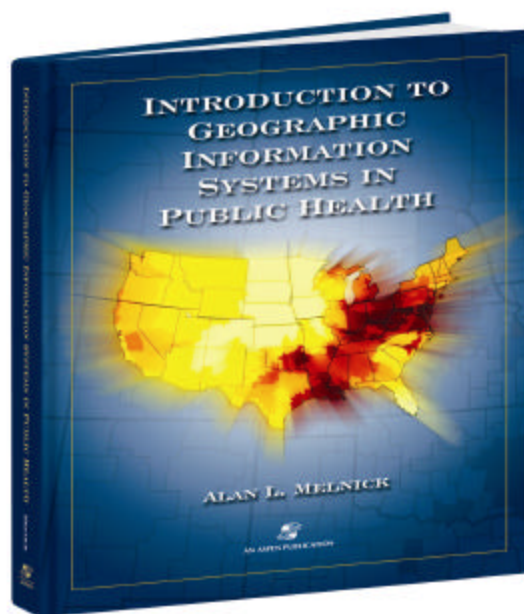
Expected Results and Implications for Risk

Assessment: The main result of the research will be the provision of a convenient method for users of environmental data drawn from disparate sources to carry out more efficient estimation and prediction than is possible from separate analyses of the data components. Clearly, those risk assessment procedures which rely on accurate characterizations and projections of an environmental variable across space and time stand to benefit. For example, our approach should make possible more rapid detection of global or local climate change or other kinds of environmental change and may also serve to reduce the cost of present and future environmental monitoring programs. Supplemental Keywords: Monte Carlo methods, trends, streamflow, prediction. [Progress reports for 1999 and 2000 are located at http://es.epa.gov/ncer_abstracts/grants/98/statistics/zimmerman.html]

Other Literature: Books

Introduction to Geographic Information Systems in Public Health, Alan L. Melnick, Aspen Publishers, Inc. The author incorporates many of the mapping products that appeared in the 1999 two special issues of the *Journal of Public Health Management and Practice*, Geographic Information Systems in Public Health: Parts I and II, by Thomas Richards, MD, and Charles Croner, Ph.D., [Issue Editors], Centers for Disease Control and Prevention. These maps were the result of a national GIS map solicitation and have provided valuable examples of public health applications. The author has assembled these with some expanded topics and discussion into one convenient resource. Both the special journal issues and this book are published by Aspen Publishers, Inc. "Introduction to Geographic Information Systems in Public Health" should be especially useful for new to GIS public health professionals in their understanding of what GIS is, how

it works, how its being applied, and how it shapes their careers. **Table of Contents:** Introduction; GIS Data Acquisitions and Storage; GIS Data Transformation: Making Maps; Public Health GIS Applications: Environmental Health; Public Health GIS Applications: Communicable Disease Prevention and Control; Public Health GIS Applications: Injuries; Public Health GIS Applications: Chronic Disease Prevention; Public Health GIS Applications: Community Health Assessment and Planning; Limitations of GIS: Lessons Learned and Challenges; Getting Started with GIS: Hardware, Operating Systems and GIS Software; The Future of GIS and the Role of Public Health Officials. [Alan Melnick, MD, MPH, is Assistant Professor and Director, Joint



Residency in Family Medicine/Public Health & General Preventive Medicine, Oregon Health & Science University, and Health Officer, Clackamas County, OR; see: www.aspenpublishers.com]

Journal Articles and Other Submissions

Using GIS and historical records to reconstruct residential exposure to large-scale pesticide application, Brody JG, Vorhees DJ, Melly SJ, Swedis SR, Drivas PJ, Rudel RA. (Silent Spring Institute, Newton, MA), *J Expo Anal Environ Epidemiol* 2002 Jan-Feb;12(1):64-80. **Abstract:** Investigation of

pesticide impacts on human health depends on good measures of exposure. Historical exposure data are needed to study health outcomes, such as cancer, that



involve long latency periods, and other outcomes that are a function of the timing of exposure. Environmental or biological samples collected at the time of epidemiologic study may not represent historical exposure levels. To study the relationship between residential exposure to pesticides and breast cancer on Cape Cod, MA, historical records of pesticide use were integrated into a geographic information system (GIS) to estimate exposures from large-scale pesticide applications between 1948 and 1995. Information on pesticide use for gypsy moth and other tree/vegetative pest control, cranberry bog cultivation,

other agriculture, mosquito control, recreational turf management, and rights-of-way maintenance is included in the database. Residents living within or near pesticide use areas may be exposed through inhalation due to drift and volatilization and through dermal contact and ingestion at the time of application or in later years from pesticides that deposit on soil, accumulate in crops, or migrate to groundwater. Procedures were developed to use the GIS to estimate the relative intensity of past exposures at each study subject's Cape Cod addresses over the past 40 years, taking into account local meteorological data, distance and direction from a residence to a pesticide use source area, size of the source area, application by ground-based or aerial methods, and persistent or nonpersistent character of the pesticide applied. The resulting individual-level estimates of relative exposure intensity can be used in conjunction

with interview data to obtain more complete exposure assessment in an epidemiologic study. While the database can improve environmental epidemiological studies involving pesticides, it simultaneously illustrates important data gaps that cannot be filled. Studies such as this one have the potential to identify preventable causes of disease and guide public policies. [See: <http://www.silent.spring.org>]

Modelling a discrete spatial response using generalized linear mixed models: application to Lyme disease vectors, Das A, Lele SR, Glass GE, et al., *International Journal of Geographical Information Science*, 16: (2) 151-166 MAR 2002.

Abstract: Predicting disease risk by identifying environmental factors responsible for the geographical distribution of disease vectors can help target control strategies and optimize preventive measures. In this study we present a hierarchical approach to model the distribution of Lyme disease ticks as a function of environmental factors. We use the Poisson framework natural for count data while allowing for spatial correlations. To help identify environmental factors that best explain tick abundance, we develop an intuitive procedure for covariate selection in the spatial context. These methods could be useful in analyzing effects of environmental and climatological changes on the distribution of disease vectors, and the spatial extrapolation of vector abundance under such scenarios.

Keywords: White-tailed Deer, Geographic Information-systems, Adult *Ixodes scapularis*, Malaria Control, Dammini Acari, Ixodidae, Abundance, County

Predicting the risk of Lyme disease: Habitat suitability for *Ixodes scapularis* in the north central United States, Guerra M, Walker E, Jones C, et al,

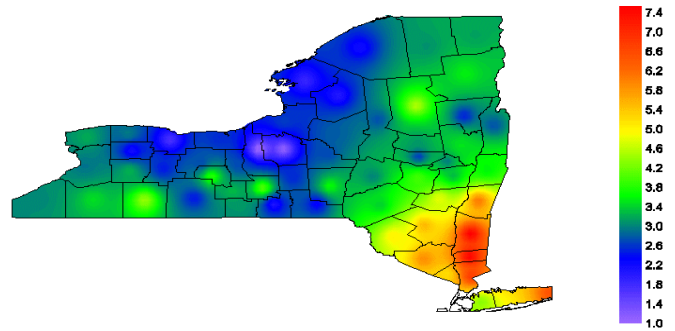
Emerging Infectious Diseases, 8: (3) 289-297 MAR 2002. **Abstract:** The distribution and abundance of *Ixodes scapularis* were studied in Wisconsin, northern Illinois, and portions of the Upper Peninsula of Michigan by inspecting small mammals for ticks and by collecting questing ticks in state parks and natural areas. Environmental data were gathered at a local level (i.e., micro and meso levels), and a geographic information system (GIS) was used with several digitized coverages

of environmental data to create a habitat profile for each site and a grid map for Wisconsin and Illinois. Results showed that the presence and abundance of *I. scapularis* varied, even when the host population was adequate. Tick presence was positively associated with deciduous, dry to mesic forests and alfisol-type soils of sandy or loam-sand textures overlying sedimentary rock. Tick absence was associated with grasslands, conifer forests, wet to wet/mesic forests, acidic soils of low fertility and a clay soil texture, and Precambrian bedrock. We performed a discriminant analysis to determine environmental differences between positive and negative tick sites and derived a regression equation to examine the probability of *I. scapularis* presence per grid. Both analyses indicated that soil order and land cover were the dominant contributors to tick presence. We then constructed a risk map indicating suitable habitats within areas where *I. scapularis* is already established. The risk map also shows areas of high probability the tick will become established if introduced. Thus, this risk analysis has both explanatory power and predictive capability.

Key words: White-tailed deer, Geographic Information Systems, *Dammini Acari*, Northwestern Illinois, *Peromyscus-leucopus*, *Borrelia-burgdorferi*, spatial analysis, *Ricinus Acari*, small mammals, New-York.

Lyme Disease in New York State: Spatial Pattern at a Regional Scale, Glavanakov S, White DJ, Caraco T, Lapenis A, Robinson GR, Szymanski BK, and Maniatty WA, *The American Journal of Tropical Medicine & Hygiene* 65(5): 538-545. **Abstract:** Lyme disease occurs commonly in New York State, but its geographic distribution is heterogeneous. Over each of nine consecutive years, incidence rates from 57 New York State counties were subjected to spatial autocorrelation analysis. Although the epidemic advanced during the study period, the analyses reveal a consistent pattern of spatial dependence. The correlation distance, the distance over which incidence rates covary positively, remained near 120 km over the nine years. A local spatial analysis around Westchester County, a major disease focus, indicated that the global correlation distance matched the extent of the most intense local clustering; statistically weaker clustering extended to 200 km from Westchester. Analyzing the spatial character of

the epidemic may reveal the epizootic processes underlying patterns in human infection, and may help identify a spatial scale for regional control of disease.



Spatial pattern of Lyme disease in New York State. Cumulative incidence rates, scaled logarithmically. Maps were obtained by kriging data associated with county centroids. Kriging uses data at discrete points to estimate a continuous surface. Disease foci are indicated by the combination of high case number (not shown here) and high incidence.

Mapping Lyme disease incidence for diagnostic and preventive decisions, Maryland, Frank C, Fix AD, Pena CA, Strickland GT, *Emerging Infectious Diseases*, 8 (4): 427-429 APR 2002. **Abstract:** To support diagnostic and preventive decision making, we analyzed incidence of Lyme disease in Maryland on the ZIP Code level. Areas of high incidence were identified on the Upper Eastern Shore of the Chesapeake Bay and in counties north and east of Baltimore City. These latter foci, especially, are not visible when mapping Lyme disease on the county level. **Key Words:** Geographic Information Systems, *Ixodes-dammini Acari*, White-tailed Deer, *Borrelia-burgdorferi*, Westchester county, Risk factors, New York, *Ixodidae*, *Scapularis*, Infection

A GIS-based decision support system for brownfield redevelopment, Thomas MR, *Landscape And Urban Planning*, 58: (1) 7-23 JAN 31 2002. **Abstract:** Rapid growth in regions surrounding large metropolitan areas leads to the phenomenon of urban sprawl. In states like Michigan, land is being converted at a rate seven times greater than formerly used (and potentially contaminated) sites are being redeveloped. City governments now see

these unused or abandoned areas as important assets in realizing the goal of urban revitalization. New legislation in Michigan provides economic (e.g. tax recapture) and legal (e.g. suspension of retroactive liability) incentives for local governments and prospective developers who are now seeking these brownfields instead of farmland and open space.

To evaluate land use options with respect to brownfields inventory, characterization, and potential for redevelopment, both government and private decision-makers need access to information regarding land capability; development incentives; public goals, interests, and preferences; and environmental concerns such as site contamination and environmental quality. This paper discusses a decision support system that provides access to state, regional, and local geospatial databases, several informational and visualization tools, and assumptions useful in providing a better understanding of issues, options, and alternatives in redeveloping brownfields.

The resultant decision support system is augmented by a unique geographic information systems (GIS)-based land use modeling application called Smart Places' as an integrated expert system. The decision support system is being tested in a city- and county-level brownfield identification, screening, and marketing effort in Jackson County, Michigan. This project represents a testbed for decision-makers and policy analysts at all levels of government to establish urban land use policy and development guidelines that may be applicable to related land use issues in a variety of urban and urbanizing settings. While this project was conducted in Michigan, the tools and procedures used are seen as readily adaptable to other locations. (C) 2002 Elsevier Science B.V. All rights reserved.

Titles

-Population production and modelling mortality-an application of geographic information systems in health inequalities research, Mitchell R, Dorling D, Shaw M, *Health & Place*, 8 (1): 15-24 MAR 2002;

-Spatial patterns and determinants of winter atmospheric carbon dioxide concentrations in an urban environment, Wentz EA, Gober P, Balling RC, Day Ta, *Annals of the Association of American Geographers*, 92 (1): 15-28 MAR 2002;

-Within state geographic patterns of health insurance coverage and health risk factors in the US., Pickle LW, Su Y., *Am J Prev Med*, 2002 Feb; 22(2): 75-83;

-Development of geographic information systems (GIS) in China: An overview, Chen J, Li J, He JB, Li ZL, *Photogrammetric Engineering and Remote Sensing*, 68 (4): 325-332 APR 2002;

-Exploratory spatial analysis of pilot fatality rates in general aviation crashes using geographic information systems, Grabowski JG, Curriero FC, Baker SP, et al. *American Journal of Epidemiology*, 155: (5) 398-405 MAR 2002.

V. Related Census, DHHS, FGDC and Other Federal Developments

The American Community Survey

U.S. Bureau of the Census

[The Census Bureau is planning a series of regional meetings throughout 2002 to discuss and gather input on the reengineered Census 2010 plan. The first meeting took place April 4, 2002 in Dallas. Dates and locations for future meetings will be announced shortly. These open forums will give local stakeholders and other interested parties an opportunity to communicate directly with Census Bureau and Commerce Department officials about innovative plans to redesign future censuses. For more information contact Cheryl.V.Chambers@census.gov at headquarters or Paula.K.Wright@census.gov in the Dallas Regional Office]

The **American Community Survey (ACS)** is the planned replacement for the 2010 census long form, and is a new way of collecting detailed information about the characteristics of population and housing. The ACS is planned to start in 2003 with an annual sample of approximately 3 million addresses spread across all counties and American Indian Reservations, pending funding. Three testing programs using the ACS questionnaires and procedures permit comparison of ACS and Census 2000 data, so data users can understand the implications of changing to a new way of collecting this important information.

The Census Bureau has had confirmation of the general good quality and plausibility of the ACS estimates from the ACS development program so far. During the Demonstration Phase, starting with four sites in 1996 and expanding to nine in 1998, it was possible for local

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

19

experts to compare the estimates from the ACS to the 1990 census and see that the ACS results were generally plausible, given what they knew about changes in the area since 1990. Also during this period, basic measures of survey quality, such as rates of missing data, standard errors, and measures of coverage/completeness of the sample were collected for these sites.

The Census Bureau also has examined national measures of survey quality from the Census 2000 Supplementary Survey (C2SS), and compared C2SS estimates for basic ("short form") population characteristics with the Census 2000 counts. The Census Bureau also has compared C2SS state and national estimates to some of the ongoing household surveys. We will soon be comparing C2SS and Census 2000 long form estimates.

The C2SS and comparison site data have met or exceeded expectations as far as the basic measures of survey quality, using the 1990 census long form as a benchmark until comparable 2000 long form measures are available. The Census Bureau has reported on these results to advisory committees, improving our analyses based on their comments. A future Survey Data Quality report will give a comprehensive review of this information.

As far as comparability with other surveys and censuses, it needs to be recognized that different surveys

and censuses, there have been significant measurement differences between the general-purpose census long form and some of the special-purpose national surveys.

In general, the Census Bureau expects the ACS to give results more similar to the long form than to other surveys, but there are some deliberate differences in definitions that we expect to cause the ACS to give somewhat different results than Census 2000 for some questions. To put this in context, note that there were major changes in data collection between the 1960 and 1970 censuses, and a major change in the measurement of race between the 1990 and 2000 census.

For very clear-cut characteristics such as whether a housing unit is owned or rented, consistent results are expected across surveys. For characteristics that are not always clear-cut, some moderate differences can be expected. Examples are: 1) who is "living and staying" at an address, which can affect whether the unit is classified as occupied or vacant, and 2) whether a person without a job is searching "actively" for a new one, which determines whether the person is unemployed or "not in the labor force."

For very subjective items, such as whether a Hispanic respondent's self-identified "race" is reported as "White" or as "Hispanic," which is ultimately recorded as "Some Other Race," the results may be very sensitive to exactly how the question is presented to the respondent.

Exact agreement of the ACS with either the long form or other surveys is not expected, for the reasons just discussed. What is important is whether the differences have sensible explanations that do not reflect poorly on the quality of the ACS data collection, taking into account that it is meant to be a general-purpose survey to produce sub-national data comparable in quality to the census long form. The Census Bureau has observed some differences between the C2SS and Census 2000, and between the C2SS and other household surveys. The causes of these differences are being studied in depth.

[Source: American Community Survey Alert, No. 3, March 28, 2002; The American Community Survey Web site has a Library section at <http://www.census.gov/acs/www/Library/index.htm> that provides articles, papers, presentations and speeches about the American Community Survey. This section also will contain the Public Use Microdata Sample (PUMS) files at a future date. If you have any questions or comments about the



**American Community Survey (1999-2002)
31 Comparison Sites**

of good quality can give different results depending on what questions they ask, what time periods they cover, and how the interviews are conducted. In previous

PUBLIC HEALTH GIS NEWS AND INFORMATION

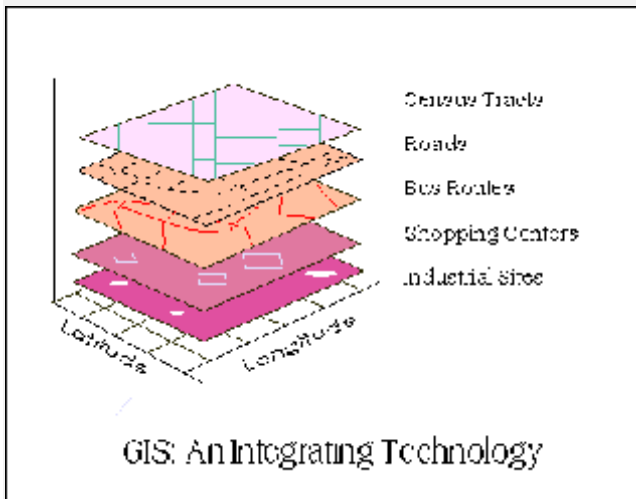
May 2002 (No. 46)

20

American Community Survey or the Census 2000 Supplementary Survey, please call 1-888-456-7215, or write to cmo.acs@census.gov

Federal Geographic Data Committee (FGDC)

[The Federal Geographic Data Committee (FGDC) is an interagency committee, organized in 1990 under OMB Circular A-16, that promotes the coordinated use, sharing, and dissemination of geospatial data on a national basis. The FGDC is composed of representatives from seventeen Cabinet level and independent federal



From Kenneth E. Foote and Margaret Lynch, The Geographer's Craft Project, Department of Geography, The University of Colorado at Boulder

agencies. The FGDC coordinates the development of the National Spatial Data Infrastructure (NSDI). The NSDI encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data. The 17 federal agencies that make up the FGDC (pending DHHS membership) are developing the NSDI in cooperation with organizations from state, local and tribal governments, the academic community, and the private sector. See <http://www.fgdc.gov>

FGDC Tribal Working Group Charter

(Approved May 7, 2002,

FGDC Coordination Group)

Purpose: The Tribal Working Group is established under the auspices of the Federal Geographic Data Committee (FGDC), created under OMB Circular A-16, to facilitate development of compatibility within Federal agency and tribal geographic information systems. This Tribal Working Group will enable higher-level services and decision support in tribal related matters and will

foster creation of new and more efficient applications, appropriately targeted outreach efforts, and education within and outside of the family of Federal agencies. Facilitating and enabling access to distributed seamless geospatial data and merging data for user applications are among the goals of the Tribal Working Group.

Scope: The Tribal Working Group shall focus on tribal participation and development of tribal geographic data and policies, which will build upon related FGDC activities. The Tribal Working Group will also take a leadership role in outreach, education, and partnership development to facilitate applications that address issues of mutual concern. The scope will include such areas as education, training, natural resource and environmental management, homelands protection, and land-use planning.

Membership: The Tribal Working Group shall consist of representatives designated by the Federal agencies and will actively seek participation from Tribes and Tribal organizations. Roles are envisioned for Federal agency staff presently involved in strategic and programmatic activities concerning geospatial data dissemination, data integration, mapping, decision-support, and location-based services. Representatives should be familiar with the goals and concepts of accessibility to geospatial data. Each subcommittee and member Federal agency of the Tribal Working Group shall designate its representative, and an alternate if necessary. Due to the complex nature and inter-dependencies of many technologies, it is encouraged that Federal agencies nominate staff that are actively involved in such activities and are able to participate in the Tribal Working Group on a continuing basis. Other Federal agencies/organizations may be added with the concurrence of the Tribal Working Group.

A member from EPA's American Indian Environmental Office, or their designee, and the Indian Affairs (BIA), Geographic Information Officer, shall initially act as Co-Chairs of the Tribal Working Group. The Tribal Working Group may elect a Chair from another Federal Agency by a consensus of the Tribal Working Group.

Responsibility: Responsibilities of the Tribal Working Group consist of the following:

-Promote data sharing and user interfaces that encourage training and education, decision support, natural resource

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

21

management, problem solving and improve quality of life.

-Promote consistency among Tribal and Federal agencies by promoting the use of common data sets.

-Provide a forum for discussions regarding data confidentiality and ownership as well as other tribal concerns.

-Develop and maintain collaboration between the tribal geographic community and Federal information technology community, especially as it relates to implementation of the NSDI and in areas such as metadata.

-Promote the growth of tribal geographic systems development for tribal decisional support using available Federal data. Including efforts such as outreach, training and education, and technology needs assessments, to support the goals of the FGDC and to promote the tribes' abilities to improve quality of life.

Procedures: Tribal Working Group meetings shall be held at the call of the Tribal Working Group Chairperson(s), and shall be held at least semiannually. Normally, notification of meeting and an agenda will be distributed to members of the Tribal Working Group and to the FGDC Executive Secretary 21 days in advance of the meeting.

The Tribal Working Group Chairperson(s) shall report to the Chairperson of the FGDC Coordination Group when there is a need for further coordination prior to implementing Tribal Working Group decisions that impact the FGDC Steering Committee or its other subcommittees or working groups. The Tribal Working Group may establish additional rules and procedures for conducting business.

Coordinating Mechanisms: The Tribal Working Group will employ those mechanisms that are best suited to meeting its responsibilities, such as working group meetings, national user forums, user surveys and analyses, geo-spatial data user workshops, research initiatives, and cooperative ventures with the Federal and non-Federal sectors. The Tribal Working Group will take special care to employ those mechanisms that engage those outside the Federal sector.

The Tribal Working Group Chairperson(s) will coordinate the Tribal Working Group's activities with other FGDC subcommittees, working groups, and other FGDC components. The coordination activities do not

need the prior approval of the Coordination Group but that group will be kept informed by the Chairperson's participation in the FGDC's Coordination Group.

Reports: The Tribal Working Group Chairperson(s) shall provide a draft report of Tribal Working Group meetings, including Tribal Working Group recommendations and action items, to all Tribal Working Group members for review prior to approval. The Tribal Working Group Chairperson(s) shall provide the final report of Tribal Working Group meetings to all Tribal Working Group members, the Executive Secretary, and the chairpersons of the FGDC Coordination Group, subcommittees, and working groups. The Tribal Working Group will provide an annual report of its accomplishments to the FGDC Coordination Group.

Termination: The Tribal Working Group shall remain in existence for two years after approval of the FGDC.

[Contact: Alison Kiernan, FGDC Executive Secretary, at akiernan@fgdc.gov]

Web Site(s) of Interest for this Edition

http://www.wgis.org/gis_ed/gis_day.html **Regional GIS professional Education Programs**. Michael Sherman, Director, Office of Technology Development and Applications Support and Program Manager, Washington Geographic Information System Consortium (WGIS) provides a list of regional GIS professional education programs (and web addresses) available to the Washington Metropolitan region. These include **Pennsylvania State University** Web-Based GIS Certification; **Virginia Tech** GIS Courses; **Towson University**, Center for Geographic Information Certificate Program; **George Mason University** Office of Continuing Professional Education-Professional Certificates in Geographic Information Systems and Crime Mapping and Analysis; **University of Maryland-College Park**, Department of Geography; and **George Washington University**, Department of Geography.

<http://www.healthgis-li.com> **The GIS-H for Breast Cancer Studies on Long Island**. The National Cancer Institute (NCI) has developed a prototype geographic information system (GIS-H) for breast cancer studies as part of the Long Island Breast Cancer Study Project

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

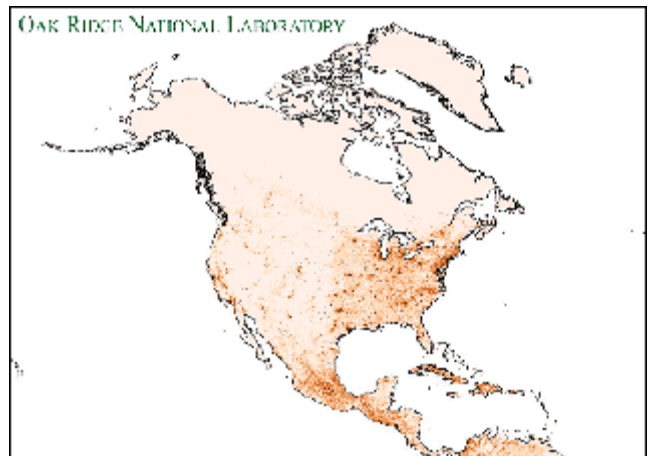
22

(LIBCSP). Researchers now have a unique, new tool with which to study relationships between environmental exposures and breast cancer. The Geographic Information System for Health (GIS-H), completed in the spring of 2001, provides researchers a new, unique tool with which to investigate potential relationship between environmental exposures and risk for breast cancer. The website will provide the public a detailed view of the environment and breast cancer on Long Island and insight into researchers' use of the system. Researchers are invited to apply to use the system to study breast cancer, as well as other types of cancer and other diseases and conditions. In mid 2002, a mapping facility will open on this site that will enable one to see, and use, some of the content and features of the system. A demonstration of the public website on Long Island is planned at that time. Applications and agreements are available for the researcher to submit to the National Cancer Institute for approval to use the GIS-H Data Warehouse and the GIS-H software. Researchers will not be allowed access unless they have completed the approval process.

<http://www.sanantonio.gov/ENVIRO/EMD/AIRQUALITY.ASP> **The Air Quality Health Alert Plan (AQHAP)** for the San Antonio region establishes guidelines and procedures for reducing emissions of ozone-forming compounds into the atmosphere, both on "Alert" days as well as throughout the ozone season. The major source of pollution in the San Antonio region is automobiles and the increased pollution they generate during traffic jams and "rush hour." Based on measurements taken from 1998, 1999, and 2000, San Antonio's three-year average of 86 ppb qualified it as a "dirty air" or non-attainment city. That designation could result in the loss of federal highway funds, business and industrial restrictions, tougher vehicle inspection standards and increased prices at the gasoline station. This designation has been put on hold until recently when the Supreme Court ruled in favor of the lower courts decision that the 8-hour standard is legal but unenforceable. This means that the EPA must rewrite their implementation policy, which may take several months.

<http://www.cs.rpi.edu/research/tempest> **Interactive Tools for Ecological and Epidemiological Simulation.** The study of spatial and temporal aspects of multi-species biological systems is central to ecology. Epidemics have special significance in terms of agriculture, public health and ecology. A software package named TEMPEST implements this model on several high performance (parallel) computers, additional information is available on-line. This document describes the use of interactive simulator of the model, named GUST (GUST is an acronym for Graphical User interface Simulation Tool) which has been implemented in Java for use over the world wide web (WWW). The purpose of this tool is to provide access to a hands on way for ecologists and epidemiologists to experiment with the model.

<http://sedac.ciesin.columbia.edu/plue/gpw/landscan> The **LandScan data set** is a worldwide population database compiled on a 30" X 30" latitude/longitude grid. Census



North America Ambient Population, 2000

counts (mainly at sub-national level) were apportioned to each grid cell based on probability coefficients, which are based on proximity to roads, slope, land cover and nighttime lights. LandScan 2000 has been developed as part of Oak Ridge National Laboratory (ORNL) Global Population Project for estimating ambient populations at risk. The LandScan files are available on our ftp server in Band Interleaved by Line (BIL) format by continent and in ESRI grid format for the world. You can access

the data files after user registration through the data links.

The LandScan data set is a worldwide population database compiled on a 30" X 30" latitude/longitude grid. Best available census counts (mainly at sub-national level) were apportioned to each grid cell based on probability coefficients, which are based on proximity to roads, slope, land cover and nighttime lights. LandScan 2000 has been developed as part of the Oak Ridge National Laboratory (ORNL) Global Population Project for estimating ambient populations at risk.

Digital Elevation Model, and a DTM is a Digital Terrain Model. A DEM usually refers to a 'First Surface' elevation model which contains elevations for surface features such as trees, buildings, etc. A DTM usually refers to an elevation model that has had all these features removed. It represents a "bald earth" model. DTM's are traditionally acquired using Photogrammetric techniques which are very accurate, but labor intensive. GLOBAL Terrain DEM products are DEM's; that is they include features such as trees and buildings within the elevation measurements.

<http://www.globalterrain.com/default.htm> A DEM is a

Final Thoughts

Regional Health-Environment Alliance

Lee Carpenter, EMS Environment Institute, Penn State University

Charles M. Croner, Centers for Disease Control and Prevention

[Alliance participants include federal- and state-level, private sector, and higher education representatives. The Pennsylvania State University, The Johns Hopkins University, Pennsylvania Department of Environmental Protection, Pennsylvania House of Representatives, Pennsylvania Topographic and Geologic Survey, NASA, CDC, Open GIS Consortium, the Environmental Systems Research Institute, and the GeoData Alliance are among those involved in the Regional Health-Environment Alliance]

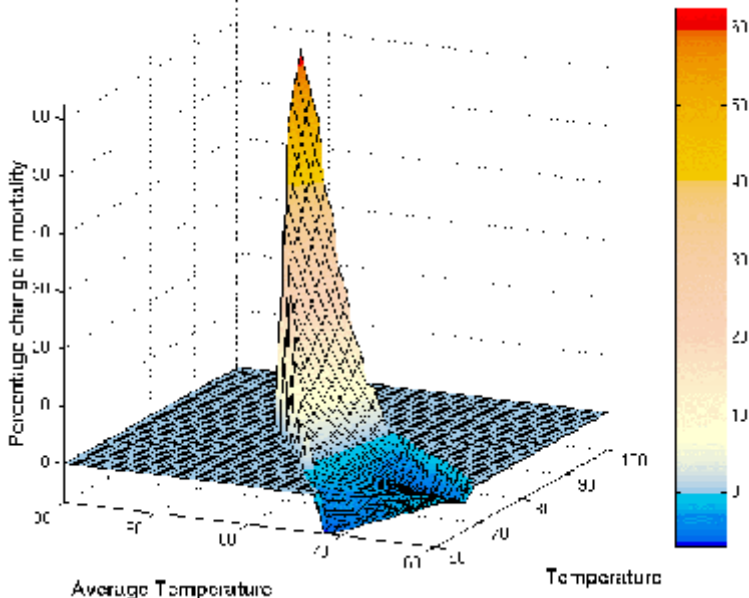
I. Introduction to the Alliance

A mild winter allows mosquitoes to "over-winter" and increase in population. A dry spring leads birds to gather at water resources and thus not reduce mosquito populations via natural predation. Summer warmth and significant rainfall

combine to create breeding sites and conditions for further rapid growth. In this scenario, weather and climate conditions are perfect for the rapid spread of West Nile virus. If health officials wanted to forecast the location of possible West Nile virus sites, and thereby act to prevent outbreaks, how could they do so? Taken a step further, what does the health community need to improve its ability to anticipate linked health-environment outcomes?

One valuable source is a newly formed alliance that is developing ways to communicate information about the presence of environmental and climate conditions affecting human health. The **Regional Health-Environment Alliance** is making effective use of forecasting, modeling tools, and information management technologies to gain a better understanding of the consistent relationship among weather, climate, and human health outcomes. The Alliance has the capability

CVD and Temperature, New York, 1987-1994



Courtesy: Jonathan Patz

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

24

to address a variety of health issues, including impacts of severe weather (West Nile virus, Lyme disease), health risks associated with air and water pollution (asthma), contamination of pathways of water and foodborne illnesses, bioterrorism, and transmission of otherwise infectious diseases.

The Alliance is an innovative federation of experts in public health, climate and weather science, information science, ecosystem science, and education. Its objective is to predict the spread of infectious diseases in particular environmental settings in order to avoid harmful health results. The strategy is to identify, inform, and manage the risk of weather and climate-related health threats by forecasting outbreaks using powerful models and technologies. Emphasis is being placed on (a) integrating regional observations into a coherent regional information framework; (b) creating modeling capability that enables the prediction of disease onset and evolution; (c) developing an integrated, comprehensive, and approachable regional information system; (d) completing process studies of key problems and issues; and (e) creating and maintaining a vigorous and continuous link to users and decision makers.

·**Integration of regional observations**. At a regional level, the Alliance has the potential to integrate observations into a common framework, building on existing weather, hydrologic, health, and remote sensing capabilities in order to create a more effective and efficient use of current and past observations and to create greater utility in addressing human health issues.

·**Creation of modeling capability**. Forecast products, ranging from weather forecasts, to seasonal outlooks, to trend projections, will be tailored and modeled to address health issues.

·**Development of an integrated, comprehensive regional information system**. A wide variety of approaches and information technologies will be developed that support scientific exploration, collaboration, and decision-making by combining environmental informatics with bioinformatics.

·**Completion of process studies**. Studies will be conducted to gain understanding of the spatial distribution and spread of diseases and their links to climate and land cover.

·**Creation of a vigorous, continuous link to users and decision-makers**. Links will be created via outreach and education, research and development, evaluation, dialogue, and incorporation of space and time scales and diverse variables of importance to users.

A proposed cooperative initiative with the GeoData Alliance (<http://www.geoall.net>) is the development and implementation of a peer-to-peer Geographic Information System (GIS)-based file-sharing capability as part of an integrated, comprehensive regional information architecture. This set of peer-to-peer and place-based information-handling protocols will allow Alliance participants to collaboratively improve forecasts. Key features of the proposed implementation include the following:

- A system that allows any peer to browse and download data from any other peer
- GIS-based capability graphical display information
- Easy software installation and operation, even for non-technical users
- Support for multiple data formats
- Basic data documentation tools
- Ability to perform keyword and spatial searches of any data set on the network
- Software that can be widely distributed among Alliance members.

II. Alliance Meeting Presentation Notes

The following are notes from the groundbreaking meeting of the Health Alliance. The presentations at the February 7, 2002, meeting featured many applications of GIS science. **Jonathan Patz**, Bloomberg School of Public Health, Johns Hopkins University, challenged with the questions “How can we better understand environmental determinants in the region?” and “What are the public health impacts of the 25 million pounds of antibiotics added to animal feed in the U.S. annually?” He noted that 68 percent of waterborne disease outbreaks are preceded by precipitation events, tested the

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

25

significance of this relationship with Monte Carlo simulation, and asked what other variables besides rainfall be entered in the model. Lancaster county was shown to have highest densities of streams and livestock. Amish farmers may be more at risk to cryptosporidiosis as they drink from shallower wells and are less prone to watch TV (e.g., for public health advisories).

Kathleen LoGiudice, Institute of Ecosystem Studies, discussed biodiversity and Lyme disease. The white-footed mouse provides the primary host for the tick and highest nymphal infection prevalence (testing for *Borellia*) in Duches county, PA. Mice densities are highest in this county. **Dana Fochs**, ID Analysis and Johns Hopkins University, examined the impacts of climate change on Lyme disease in the Mid-Atlantic and Upper Midwest States. His question was "What do weather drivers do to transmission?" He noted the moisture carrying capacity was critical to arthropods. Just a change in temperature of several degrees can effect mosquito incubation and impact their survival e.g., saturation deficit is a key driver in the reduction of risk transmission.

Rolf Halden, Bloomberg School of Public Health, Johns Hopkins University, discussed toxins as modifiers of human vulnerability to disease. Possibly 40 percent of U.S. streams are not clean enough for consumption related activity. About 1.2 trillion gallons of sewage and storm water annually are discharged into streams. And agricultural sources account for about 70 percent of water pollution. Hurricanes and extreme weather events cause overflow conditions, introducing pollutants and antibiotics into the water. US Geological Survey (USGS) has detected 75 pharmaceuticals in streams and, in 2001, these appeared in 80 percent of all streams. Health outcomes such as gastroenteritis affect a substantial amount of people worldwide and need our collective study. **Steve Guptill**, USGS, discussed land use influences on vector-borne diseases. He showed mosquito-borne LaCrosse Encephalitis high in W. Virginia and Appalachia. Bird migratory pathways on the East coast may be related to the spread of West Nile Virus and are under study.

Many others provided presentations. Briefly, **Nancy Maynard**, NASA Goddard Space Flight Center, expressed much interest on the part of NASA to help in the study of public health. NASA is concerned with infectious and vector-borne diseases, Rift Valley fever, asthma (indoor and outdoor ambient sources), heat and extreme weather risks, W. Nile Fever and other conditions. **Robert Crane**, Associate Dean for Education, Penn State University, presented a historic synoptic analysis. He addressed the question of what is our capability to forecast environmental change and variability, and its potential affect on human health. He explored downscaling (deriving relationships from global to local) and self-organizing maps. The latter are maps comprised of iterative updating grid cells that capture non-linear characteristics of the climate data. **David Pollard**, Earth Systems Science Center, Penn State University, extended Crane's discussion to predicting climate anomalies over the U.S. That prediction is based on processes and not individual events.

Compton (Jim) Tucker, NASA Goddard Space Flight Center, discussed the development of satellite remote sensing technologies to study land cover and environmental change. He has studied higher N. Latitude photosynthetic trends and the landscapes related to outbreaks of two hemorrhagic fevers, Rift Valley and Ebola. **Eric Post**, Biology Department, Penn State University, discussed potential ecological effects of the North Atlantic Oscillation (NAO) which creates a pressure corridor affecting both sides of the Atlantic. His interest is in the relationship of NAO to animal host dynamics. **Ann Fisher**, College of Agriculture, Penn State University, and lead author for the March 2000 report *Preparing for a Climate Change: The Potential Consequences of Climate Variability and Change*, discussed a variety of environmentally induced and known/suspected health related outcomes.

Uriel Kitron, College of Veterinary Science, University of Illinois at Urbana Champaign, discussed tools for analysis of landscape ecology and the epidemiology of vector-borne diseases. He has used logistic regression to create risk or habitat suitability model maps for predicting Lyme disease in Wisconsin and Illinois. Recent work appears in CDC's *Emerging Infectious Disease* journal. **Jennifer Harar**, Environmental Systems Research Institute (ESRI), discussed information technology and the state-of-the-art suite of tools available to assist decision makers. **Richard**

PUBLIC HEALTH GIS NEWS AND INFORMATION

May 2002 (No. 46)

26

Johnson, National Imagery and Mapping Agency, discussed the power of new ranging sensors such as LIDAR (Light Detection and Ranging) and IFSARE (Interferometric Synthetic Aperature Radar). LIDAR is designed for fair weather but utilizes laser technology very sensitive (detailed) to height while IFSARE utilizes X-band radar and can be flown at night or during inclement weather. **Carl Reed**, Open GIS Consortium (OGC), concluded the formal presentations to show that OGC is defining interfaces that support interoperability (open platforms) to support problem solving. That the binding element is the Internet with access to distributed geographic information and services.

Prior to ensuing panel discussions, **Eric Conrad**, PA Department of Environmental Protection, informed the audience of the Pennsylvania Incident Response System, known as PAIRS. The surveillance and reporting system contains both health and environmental data for decision makers. It provides a secure Internet-based application for reporting and tracking events of all types including potential terrorism associated with anthrax, smallpox, and nuclear or chemical attacks, contamination of water treatment facilities, and a host of other events associated with toxic spills, natural disasters and emergency response needs. An article entitled "The Commonwealth of Pennsylvania's Incident Response System Grows Out of Virus Surveillance System," appears in the current edition of ESRI's *ArcNews* (24):1, Spring 2002, and provides greater detail of this development.

I want to recognize those who participated in the ensuing panels. The first addressed the question: What are the Alliance's strengths, weaknesses and opportunities?" Panelists included **Richard Johnson** (Chair), **Jonathan Patz**, **Nancy Maynard**, **William Easterling** (Director, Penn State Environmental Consortium), **Kathy Covert** (Executive Director, GeoData Alliance) and **Jay Parrish** (Director, Bureau of Topographic and Geologic Survey). The second addressed the question: "How can the Alliance garner support?" Panelists included **Eric Barron** (Director, EMS Environment Institute, Penn State University and Conference Organizer), **Todd Bacastow** (Assistant Director, EMS Environment Institute and Conference Chair), **Robert Venezia** (Program Manager for Public Health, NASA), **Darrell Kirch** (Dean, Hershey Medical School), **John Dutton** (Dean, College of Earth and Mineral Sciences, Penn State University) and **Eugene Klynoot** (Deputy Secretary, PA Department of Agriculture).

[For additional information about the Alliance, and how your agency or interest group can play a role in its development, check the web site at <http://webgis1.essc.psu.edu/users/healliance/> or contact **Eric Barron**, at eric@essc.psu.edu or **Todd Bacastow**, at bacastow@psu.edu]

Charles M. Croner, Ph.D., Editor, *Public Health GIS News and Information*, Office of Research and Methodology, National Center for Health Statistics at cmc2@cdc.gov. While this report is in the public domain, the content should not be altered or changed. This is the 46th edition with continuous reporting since 1994.

Please join us at NCHS on June 12, 2002 for the NASA and Public Health Presentation

Our GIS home page at <http://www.cdc.gov/nchs/gis.htm> contains archived reports