**PUBLIC HEALTH GIS NEWS AND INFORMATION**

**January 2002 (No. 44)**

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



## I. Public Health GIS (and related)Events

### SPECIAL NCHS/CDC/ATSDR GIS LECTURES

**FEBRUARY 12, 2002**. **"Mapping Community-Level Housing and Related Data on the Web at the Department of Housing and Urban Development (HUD)"** by Jon Sperling and David Chase, U.S. Department of Housing and Urban Development (HUD), from 2:00-3:30PM. This NCHS Cartography and GIS Guest Lecture Series programs 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 presentations 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 101st 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*]

☛ Data Management, Integration, and Dissemination for Public Health Action, January 16-18, 2002, Minneapolis, MN [See: http://www.cdc.gov/epo/dphsi/conference/dataman.htm]

☞ 12th Annual Texas GIS Forum and Training Conference, The Texas Natural Resources Information System (TNRIS), January 30-February 1, 2002, Austin, Texas [See site: http://www.tnris.state.tx.us/gisfestival]

☛ Fifth Annual International Conference: Map India 2002, February 6-8, 2002, New Delhi, India [See: http://www.mapindia.org]

☞ 8th Biennial Symposium on Minorities, the Medically Underserved & Cancer, February 6-10, 2002, Washington, D.C. [See: http://www.iccnetwork.org]

☛ GIS and Crime Science Conference, February 14, 2002, University of London, London, England [See: http://www.ucl.ac.uk/spp/jdi/events_pubs.htm]

☞ 98th AAG Annual Meeting of the Association of American Geographers, March 19-March 23, 2002, Los Angeles, California [See: http://www.aag.org]

☛ 15th Annual Geographic Information Sciences Conference, "Thinking outside of the box: New GIS users and new GIS applications," Towson University, March 25-26, 2002 [See site: http://cgis.towson.edu/tugis2002]

☞ 41st Annual meeting of the Southern Regional Science Association, April 11-13, 2002, Arlington, VA [See:www.srsa.org]

☛ Delaware GIS 2002: "Connecting Communities," April 18, 2002, Rehoboth Beach, DE [See: http://www.state.de.us/planning/gis2002]

☞ 26th SAS User Group International SUGI Conference, April 14-17, 2002, Orlando, FL [See: http://www.sas.com/usergroups/sugi/sugi27/index.html]

☛ 51st Annual Epidemic Intelligence Service (EIS) Conference, April 22-26, 2002, Decatur, GA [See: http://www.cdc.gov/eis/annualconf/annualconf.htm]

☞ Annual meeting of the Association for Professionals in Infection Control and Epidemiology, Inc., May 19-23, 2002, Nashville [See: http://www.apic.org]

☛ Climate Variability and Change and their Health Effects in the Caribbean: Information for Climate Variability and Change Adaptation Planning in the Health Sector, Pan American Health Organization/World Health Organization, May 20-21, 2002, Bridgetown, Barbados [See: http://www.cpc.paho.org]

☞ 20th National Conference on Health Education and Health Promotion, "Strengthening American through Health Education and Health Promotion Alliances, June 5-7, 2002, New Orleans, LA [See: http://www.astdhpphe.org]

☛ Hawaii International Conference on Statistics and Related Fields, June 5-9, 2002, Honolulu HA [See: http://hcstatistics.org/hotel_stats.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 **Mark DeMulder**, USGS (Announcing the Final Report, **The National Map**): In January 2001, the Associate Director for Geography, USGS, created a task force to define a vision for providing topographic data and maps to the Nation in the 21st century. The report of that task force "The National Map," now is final and is posted at the USGS site http://nationalmap.usgs.gov. We also have posted a companion document, "Issues and Actions," that synthesizes comments received on the draft report during public review that ended on June 29

We received nearly 130 comments during the public review. During the summer, USGS staff investigated the comments, reviewed suggested modifications to the report, and identified numerous changes that were made. The revised draft then was provided to a group of selected reviewers representing the geology, water resources, and biology disciplines at USGS and five professional organizations: American Society for Photogrammetry and Remote Sensing, Association of American State Geologists, Cartographic Users Advisory Council, Management Association for Private Photogrammetric Surveyors, and National States Geographic Information Council.

"The National Map" report is the foundation upon which we are finalizing a 5-year plan for the Cooperative Topographic Mapping Program, which is the USGS program that bears the greatest responsibility for the success of "The National Map." At the Web site, you also will find a fact sheet that summarizes "The National Map" vision and fact sheets that detail our current pilot projects that are intended to evolve partnerships and result in tangible evidence of our long-term commitment to the vision. Your interest in "The National Map" and your participation in the public review are appreciated. We hope that you will find the final report and the "Issues and Actions" document responsive to the suggestions we received from the review. [Contact: Mark, Coordinator, Cooperative Topographic Mapping Program, at nationalmap@usgs.gov]

2. From **Art Getis**, San Diego State University: On October 12, I presented the talk **"Spatial Analytic Approaches to the Study of the Transmission of Disease: Recent Results on Dengue Fever in Iquitos, Peru,"** at the University of Michigan in their Educational Program for GIS/Spatial Analysis. I summarized some of our findings on spatial patterns of entomological variables. We make extensive use of GIS to identify statistically significant spatial clusters of variables such as adult Aedes aegypti mosquitoes,

pupae, and larvae. This is part of a project funded by the National Institutes of Health. The principal investigator is Thomas W. Scott, University of California (UC) Davis, I am a co-investigator, and Amy Morrison, UC Davis, is the chief investigator in Iquitos. [Contact: Art, Professor, Department of Geography and Co-Editor, *Journal of Geographical Systems*, at arthur.getis@sdsu.edu]

3. From **Iris Shimizu**, NCHS (**2002 Summer Program in Biostatistics**): The Center for Biostatistics at The Ohio State University announces the 2002 Summer Program in Applied Statistical Methods. The 2002 Summer Program will consist of 13 courses in the application of statistical methodology to a wide range of biomedical problems [See site: www-biostat.med.ohio-state.edu/summer/summer_program.htm].The 2002 program will run from June 10, 2002 to June 28, 2002.

B. Department of Health and Human Services

**Agency for Healthcare Research and Quality**

4. In 2002, the **Journal of General Internal Medicine** (JGIM) will publish a Special Issue devoted to **community-based participatory research** (CBPR). This model of research emphasizes active involvement of community representatives and organizations in all stages and aspects of the research process as a means toward generating highly relevant findings in a manner that is ethical and beneficial to those involved. The Special Issue will highlight some of the outstanding work that is being done in this area and the role that it can play in improving the care and outcomes of populations at risk. CBPR has been identified as a key strategy in efforts to reduce disparities, whether they are racial, ethnic, socioeconomic or geographic. This Special Issue on CBPR builds on efforts of the Society of General Internal Medicine, the Agency for Healthcare Research and Quality, and the W. K. Kellogg Foundation to help CBPR fulfill its potential as an important influence on health care policies and practices. Authors are encouraged to submit original research articles and brief reports as well as manuscripts that would fit the Journal's sections for Innovations in Education and Clinical Practice, Populations at Risk, and Health Policy.[Contact: Kaytura Felix Aaron, Center for Primary Care Research, at kfaaron@ahrq.gov or the JGIM office at jgim@jhmi.edu]

**Agency for Toxic Substances and Disease Registry**

5. ATSDR's **public health assessments** are being converted to Hypertext Markup Language (HTML) format to make them available to the public over the Internet. Health assessments from October 1992 to present are now available (see http://www.atsdr.cdc.gov/HAC/PHA/index.html). These ATSDR public health assessments are organized according to the ATSDR regions where they originated. [Contact: Lorraine Adams at loa1@cdc.gov]

**Centers for Disease Control and Prevention**

6. From **Betty Smith**, NCHS: The release date for **Provisional data on Births, Deaths, Marriages, and Divorces** which will be published in *Births, Marriages, Divorces, and Deaths: Provisional Data for April-June 2001* is December 28, 2001. The data will be available to the general public at that time. Tables showing Provisional data by State will also be available from the NCHS home page on the Internet at http://www.cdc.gov/nchs. [Contact: Betty, Division of Vital Statistics, at bls4@cdc.gov]

**Health Resources and Services Administration**

7. The latest Federal Register publication listing **Health Professional Shortage Area** (HPSA) designations and withdrawals was September 15, 2000. These regulations establish criteria and procedures for the designation of geographic areas, population groups, medical facilities, and other public facilities, in the States, as health professional(s) shortage areas. *Health professional(s) shortage area* means any of the following which the Secretary determines has a shortage of health professional(s): (1) An urban or rural area (which need not conform to the geographic boundaries of a political subdivision and which is a rational area for the delivery of health services); (2) a population group; or (3) a public or nonprofit private medical facility. *Health service area*

means a health service area whose boundaries have been designated by the Secretary, under section 1511 of the Act, for purposes of health planning activities. The Web site http://bphc.hrsa.gov/databases/newhpsa/newhpsa.cfm allows download of lists of counties that have been designated as primary care Health Professional Shortage Areas.

**National Institutes of Health**

8. From **Suzanne Heurtin-Roberts** (Release of NIH report Qualitative Methods In Health Research): The Office of Behavioral and Social Sciences Research sponsored a workshop on September 30 and October 1, 1999, entitled **"Qualitative Methods in Health Research: Opportunities and Considerations in Application and Review"** (See: http://obssr.od.nih.gov/Publications/Qualitative.PDF). The purpose of the workshop document is to assist investigators using qualitative methods in submitting competitive applications for support from NIH. The document is not intended to be comprehensive, but rather, to assist applicants in thinking about qualitative research issues to be addressed when applying for NIH funding. While the perspective is on qualitative research, many of the general issues discussed apply to both qualitative and quantitative methodologies. [Contact: Suzanne, Division of Cancer Control and Population Sciences, at sheurtin@mail.nih.gov]

**Substance Abuse and Mental Health Services Administration**

9. The Substance Abuse and Mental Health Services Administration (SAMHSA) released its updated ***National Directory of Drug and Alcohol Abuse Treatment Programs***, a guide containing information on thousands of local treatment programs in each state, including facilities that provide assistance in numerous languages including 37 American Indian and Alaska Native, as well as 66 other languages (see http://www.samhsa.gov/news/news.html). The new directory also includes a nationwide inventory of substance abuse and alcoholism treatment programs and facilities at the federal, state and local levels as well as private facilities that are licensed, certified, or otherwise approved by substance abuse agencies in each of the states. The directory is organized and presented in a State-by-State format for quick-reference by health care providers, social workers, managed care organizations, and the general public.

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

10. There is a disproportionate incidence of cancer morbidity and mortality among minorities and persons of low level income in the United States. The disparities suffered by these groups have been documented through published reports. There is a critical need to develop knowledge and strategies to address this crisis with the leadership and full participation of the affected communities. The Minorities, Medically Underserved & Cancer Biennial Symposium Series was initiated in 1987 to provide a multicultural forum for this purpose. The **8th Biennial Symposium on Minorities, the Medically Underserved & Cancer** will convene February 6-10, 2002 at the OMNI Shoreham Hotel in Washington, DC. [See Section I, this edition]

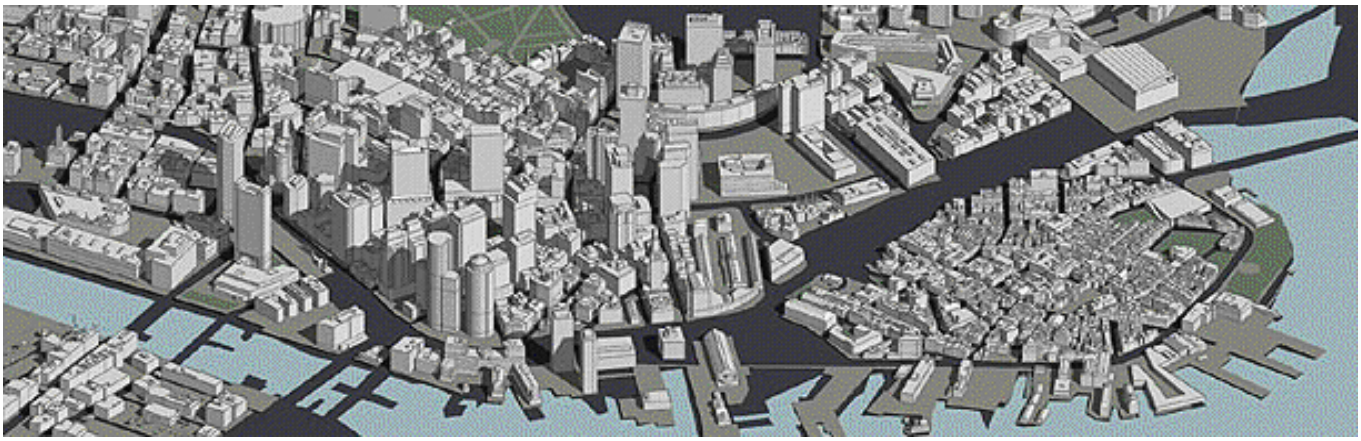
11. See Special Report this edition on the combined Howard University (Washington, D.C.) and USGS **HBCU Summer Faculty GIS Workshops** that are having an important impact on bringing GIS technology and minority scientists together. This program has operated formally for several decades. It welcomes any agency or institutional support to help insure continuation of its outstanding record of service to the GIS and public health community.

D. Other Related Agency or Business GIS News

12. From **John Calkins**, ESRI: During the 2000-01 television season, CBS portrayed "real GIS" on their Saturday night primetime television series, The District. This was the first time that GIS was prominently featured in a weekly drama. If you are interested in a free five-minute educational video showing examples of GIS in Crime Analysis as portrayed on CBS's The District (the first season) visit http://www.esri.com/thedistrict. *The District* was the first prime-time television show to use a geographic information system each and every week. With the

2000-01 season now complete, GIS users around the world should be excited and pleased with the recognition awarded their profession. [Contact: John at jcalkins@esri.com]

13. From **Urban Data Solutions**: Urban Data Solutions has developed **2D and 3D combined views** of various urban centers in the U.S. The data model here shows Boston, MA which includes over 5600 parcels, 1350 blocks, 5700 buildings, 7700 addresses, 18300 ground photos, and 16 square miles of aerial images. [See: http://www.u-data.com/city_data]



14. From **SPOT Image Corporation**, Reston, VA (SPOT Homeland Security Imagery): The **SPOT National Satellite Mosaic** (USA Select) is being marketed through government procurement as a base map for Homeland Security (see http:www.spot.com/spot-us.htm). USA Select is a product that provides a GIS base layer using current, seamless imagery with co-registered raster and vector layers (available in panchromatic and natural color), with imagery resolutions that range from sub-one-meter to one kilometer. The global SPOT satellite system includes multiple Earth observation satellites and 24 ground receiving stations worldwide. SPOT 5, to be launched in early 2002, will be the world's most robust imaging platform, producing 2.5m, 5m, 10m, 20m, 1km image resolutions, and global digital elevation models.

USA Select provides a common operating picture to support Homeland Security and the "120 Cities" projects. Based on USGS National Map Standards, this digital reference base map allows for 1) analysis on a national, regional and urban level; 2) co-registration of vectors, digital elevation models, and high resolution inserts. USA Select is created from current SPOT (10 meter panchromatic) and Landsat 7 (multispectral) imagery, merged into a true color seamless mosaic in GeoTIFF, CIB, or any other format needed. [Contact: Glenn Geoghegan at geoghegan @spot.com]

15. From **GeoLytics**, East Brunswick, NJ (Census products now shipping): The U.S. Census Bureau has recently released the first two major sets of data from the **2000 Census: Redistricting and the "Short Form."** GeoLytics is now shipping four new CD products based upon these data sets. All products include the appropriate Census 2000 mapping boundaries. **CensusCD 2000/Short Form** -Includes all of the data released by the U.S. Census Bureau from the SHORT FORM, including 3,000 variables at the BLOCK GROUP level and 8,000 variables at the TRACT Level and above. The program also includes Zip Code Tabulation Arrays offered by the Census Bureau. **CensusCD 2000/Short Form BLOCKS** - Includes all of the data released (3000 variables) from the Short Form for each of the 8 Million BLOCKS. **CensusCD 2000/Redistricting**-this includes the Redistricting data from the BLOCK GROUP and above (19 levels in total). The program also includes the 1990 Redistricting data that has been weighted to match the 2000 Census geographies, enabling easy

time series analysis (baselining). **CensusCD 2000/Redistricting Blocks** -this CD includes the Redistricting data at the BLOCK level only. The program also includes the 1990 Redistricting data that has been weighted to match the 2000 Census blocks. [Contact: Katia Segre Cohen at katia@geolytics.com]

16. From Crime Mapping Laboratory, **Police Foundation** (Washington, D.C.): This is to announce the release of the next issue of the **Crime Mapping News: 4(1), Winter 2002**. The topic of this issue of the Crime Mapping News is how mapping and analytical techniques can be used both in preparation for and in response to terrorist events such as those that occurred on September 11th, 2001. The articles in this issue cover topics including 1) a perspective on the analysts role in supporting counterterrorist activities, and 2) an overview of how GIS has been used to model the World Trade Center site. We have also included an article describing the use of ARCBridges CRIMESolv software at the Anne Arundel County, MD, Police Department. Lastly, we present a Crime Analysis Challenge composed of nine questions designed to stimulate thought and discussion. For those of you who are not on our mailing list and would like to be, please send me a note with your name, position, agency, mailing address, and email address. Every issue of the Crime Mapping News is made available in .pdf format on both the Office of Community Oriented Policing Services (COPS)site, at www.usdoj.gov/cops/cp_resources/ pubs_prod/s45.htm and Police Foundation Web site at www.policefoundation.org/docs/tech_mapping.html. [Contact: Rachel Boba, Director at rboba@policefoundation.org]

17. From **Dunrie Greiling**, TerraSeer, Inc.: Over $16,000 in software licenses was awarded to outstanding graduate student research proposals in **TerraSeer's first annual Graduate Research Contest**. The proposed research covered topics from bioterrorism surveillance, exposure assessment, spatial and temporal patterns of disease, environmental justice, and landscape ecology. TerraSeer has created a "Virtual Poster Session" for the winning entries on its site http://www.terraseer.com/forums/index.php. This forum is intended to be create a space where researchers from around the globe can participate in discussions on how to proceed with the analyses. The virtual poster session was opened November 28, 2001.

## III. GIS Outreach

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

☎ From **Paula H. Jasinski**, Chesapeake Environmental & GIS Consulting: I have been involved with trying to explain an apparent cancer cluster in children near Annapolis, MD. The state and county have looked at incidences, but have averaged them across the entire zipcode. The incidences have been contained within one neighborhood which only comprises about 1% or less of the area for this zipcode. They have released several reports stating that this is not a cluster and parents should not be worried. We don't live within that neighborhood, but feel like that cannot be the whole truth. We've looked for some of the known ALL causing agents- x-rays, certain organic chemicals and have not found a smoking gun. Can anyone point us to researchers or resources that might be able to help us figure out why so many of the children here are developing this form of leukemia? Another 8 year old was just recently diagnosed. [Contact: Paula at website http://www.chesapeakegis.com]

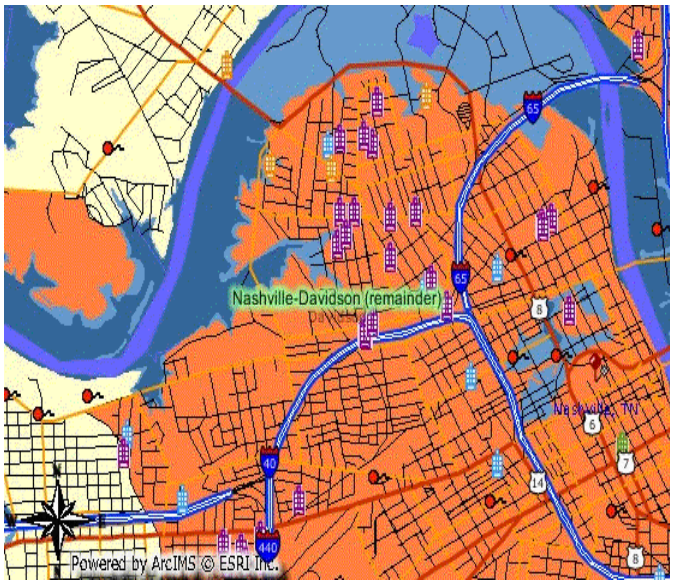
☎ From Nicholas A. Giudice, University of Minnesota: I am a graduate student in Cognitive and Biological Psychology at the University of Minnesota. Much of the research I do involves spatial cognition and wayfinding in low-vision and blind people and my focus is primarily on the psychological and underlying neural components involved in these processes. Recently however, we have received a grant to work on the research and development of virtual models to assist low-vision people with pre-journey exploration and learning of buildings. This virtual navigation will aid in the development of a cognitive map to be accessed during actual navigation through the physical building. Another component of this project is to develop an actively updated system

to provide the wayfinder with location and position information from within the building. This is much like the information one would obtain from a GPS outdoors. Thus, we are trying to develop a building database, the coordinates of which our tags can reference as the person moves through the structure. The problem is that I am totally unfamiliar with GIS and geographic/structural databases and am having trouble wading through all the extant literature. I am wondering if Public Health GIS Users might point me to some basic work that: 1. Gives a good conceptual overview of GIS; 2. Discusses application of such systems for indoor usage, i.e. providing spatial information about the structure/topological elements of a building or the related function of specific locations in that building? and 3. Discusses the conversion of architectural drawings, e.g. CAD, DXF or other structural files into a form that is usable in a GIS. Any information that you care to provide or references/suggestions that you have regarding information on any of these topics would be very much appreciated. [Contact: Nick at giud0001@tc.umn.edu]

## IV. Public Health GIS Presentations and Literature

### *NCHS Cartography and GIS Guest Lecture Series*

**February 12, 2002.**. **"Mapping Community-Level Housing and Related Data on the Web at the Department of Housing and Urban Development (HUD)"** by **Jon Sperling** and **David Chase**, U.S. Department of Housing and Urban Development (HUD). Abstract. During the past year, HUD has contracted to develop an enterprise Geographic Information System (GIS), with the goal of making the agency's spatial and spatially-related housing and related data available via the Internet. State and local governments, academic institutions, non-profit organizations and others can use this information to aid in community development and planning. While completion of a fully operable enterprise system is not yet realized, the current system offers easy integrated access to an increasing variety of HUD and other agency georeferenced datasets (e.g., EPA, Census, FEMA). HUD plans to use the enterprise GIS platform for a variety of purposes including the development of spatial analytic tools, new approaches for handling confidential geospatial information, and public data accessibility.




**Mapped HUD data on the Web**

### CDC *Emerging Infectious Diseases* and *MMWR*

### *Emerging Infectious Diseases*

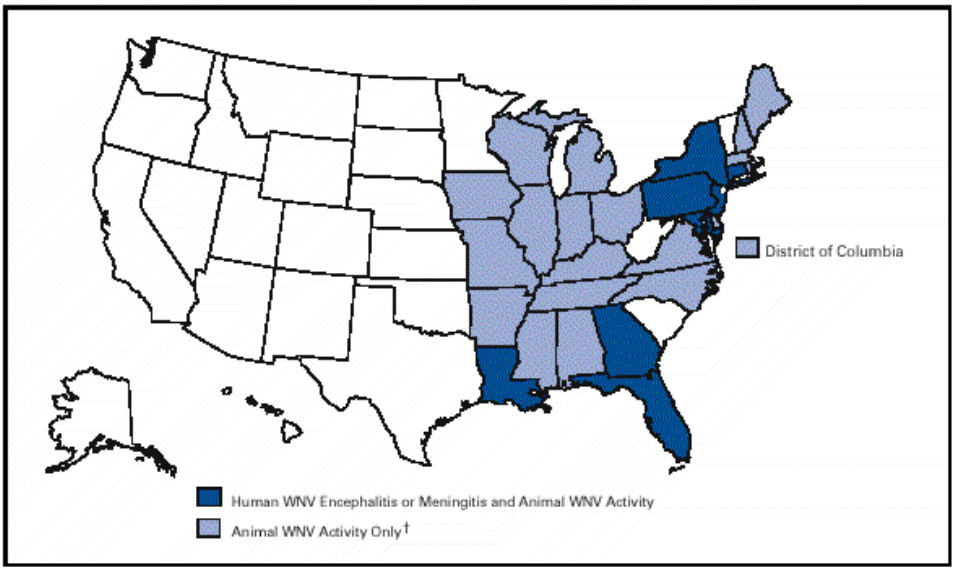
**Emerging Infectious Diseases** is indexed in Index Medicus/Medline, Current Contents, Exerpta Medica, and other databases. Emerging Infectious Diseases is part of CDC's plan for combating emerging infectious diseases; one of the main goals of CDC's plan is to enhance communication of public health information about emerging diseases so that prevention measures can be implemented without delay. The January 2002 issue of CDC's journal, Emerging Infectious Diseases (EID), is now available at http://www.cdc.gov/ncidod/EID/index.htm. This issue contains articles with potential relationships to GIS applications including: Hydrology Model To Predict Mosquito Abundances; Influenza Surveillance and Rapid Diagnostic Tests; Physician-Based Surveillance of Foodborne Illness, and others.

### *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 MMWR online at http://www.cdc.gov/ mmwr]: Vol. **50**, No. **50**- Progress Toward Interrupting Indigenous Measles Transmission-Region of the Americas, January-November 2001; Rubella Outbreak-Arkansas, 1999; Notice to Readers: Additional Options for Preventive Treatment for Persons Exposed to

**FIGURE 1. Areas reporting West Nile virus (WNV) activity — United States, 2001***




* As of November 13, 2001.
† Mississippi reported WNV infection only in a horse.

**See Report:** **http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5045a4.htm**

Inhalational Anthrax; Vol. **50**, Number **RR-22** *School Health Guidelines to Prevent Unintentional Injuries and Violence;* Appendix A: Selected Healthy People 2010 Objectives Related to Child and Adolescent Unintentional Injury, Violence, and Suicide Prevention; Appendix B: Child and Adolescent Unintentional Injury, Violence, and Suicide-Prevention Resources; Vol. **50**, Number **SS-5**- *Malaria Surveillance-United States, 1998* Vol. **50**, No. **49**- State-Specific Prevalence of Current Cigarette Smoking Among Adults, and Policies and Attitudes About Secondhand Smoke-United States, 2000; Cigarette Smoking in 99 Metropolitan Areas-United States, 2000; **Vol. 50, No. RR-21**, *Promoting Oral Health: Interventions for Preventing Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries: A Report on Recommendations of the Task Force on Community Preventive Services*; Vol. **50**, No. **48**- Update: Investigation of Bioterrorism-Related Anthrax-Connecticut, 2001; Influenza Activity-United States, 2001-02 Season; Notice to Readers: Use of Onsite Technologies for Rapidly Assessing Environmental Bacillus anthracis Contamination on Surfaces in Buildings; Vol. **50**, No. **47**- Update: Investigation of Bioterrorism-Related Inhalational Anthrax-Connecticut, 2001; Update: Adverse Events Associated with Anthrax Prophylaxis Among Postal Employees-New Jersey, New York City, and the District of Columbia Metropolitan Area, 2001; HIV Testing Among Racial/Ethnic Minorities-United States; Simultaneous Administration of Varicella Vaccine and Other Recommended Childhood Vaccines-United States, 1995-1999; Weekly Update: West Nile Virus Activity-United States, November 14-20, 2001; Notice to Readers: Alcohol Involvement in Fatal Motor-Vehicle Crashes-United States, 1999-2000; Vol. **50**, No. **46**- Surveillance of Mortality During a Refugee Crisis-Guinea, January-May 2001; Imported Wild Poliovirus Causing Poliomyelitis-Bulgaria, 2001; Notice to Readers: Weekly Update: West Nile Virus Activity-United States, November 14-20, 2001Vol. **50**, No. **45**- Coccidioidomycosis in Workers at an Archeologic Site-Dinosaur National Monument, Utah, June-July 2001; Update: Investigation of Bioterrorism-Related Anthrax, 2001; Weekly Update: West Nile Virus Activity-United States, November 7-13, 2001; Notice to Readers: Epidemiology in Action: Intermediate Methods; Vol. **50**, No. **44**- Update: Investigation of Bioterrorism-Related Anthrax and Adverse Events from Antimicrobial Prophylaxis; Nationwide Campaign for Vaccination of Adults Against Rubella and Measles-Costa Rica, 2001;

Weekly Update: West Nile Virus Activity-United States, October 31-November 6, 2001; Notice to Readers: Considerations for Distinguishing Influenza-Like Illness from Inhalational Anthrax; Notice to Readers: Interim Guidelines for Investigation of and Response to Bacillus Anthracis Exposures.

### Other Literature*: Special Reports, Books*

***Local Officials Guide to Domestic Terrorism: Resources for Local Governments***

This is the second edition (2000) of the Local Officials Guide to Domestic Terrorism: Resources for Local Governments, from the National League of Cities (see http://www.nlc.org). It updates information to reflect positive changes at the federal level that will improve support for local emergency responders as they train and equip themselves to respond to terrorist threats and incidents. Contents include: Part One: The Federal Picture- Criticism and Response; National Domestic Preparedness Office; Department of Defense; Environmental Protection Agency; Public Criticism; More Money, Better Organization; Technological Warfare; Cyberterrorism; Bioterrorism; Part Two: Local Preparedness- Taking Advantage of Federal Resources; Planning; Training and Exercises; Department of Defense; Department of Justice; Federal Bureau of Investigation; Federal Emergency Management Agency; Equipment; Intelligence and Information Sharing; Health and Medical Service; Part Three: Appendix- Information at Your Fingertips; Advice to Cities; Acronym Key; Government Directory; Pertinent Definitions; Selected References on Terrorism; Internet Sites; Articles; Compendium Courses as listed by the U.S. Army Soldier and Biological Chemical Command [See full report at http://www.nlc.org/nlc_org/site/files/reports/terrorism.pdf]

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***GIS and Public Health***

Ellen K. Cromley and Sara L. McLafferty, November 2001 (Guilford Publications, Inc.). The book lays a solid foundation in GIS, guides the reader through basic concepts and methods, and emphasizes practical applications. Described are ways that GIS can be used to map health events, identify disease clusters, investigate environmental health problems, and understand the spread of communicable and vector-borne infectious disease. Also covered are strategies for assessing patterns of health services delivery and assisting community groups in identifying local health issues. Each chapter includes tables, figures, and concrete examples, as well as useful references and Internet resources. Complementing the text is a special website featuring sample GIS databases that users can download for hands-on practice with a variety of spatial analytical techniques. Contents: Geographic Information Systems; Spatial Data; Spatial Databases for Public Health; Mapping Health Information; Analyzing Spatial Clustering of Health Events; Analyzing Environmental Hazards; Analyzing the Risk and Spread of Infectious Diseases; Exploring the Ecology of Vector-Borne Disease; Analyzing Access to Health Services; Locating Health Services; GIS and Community Health.

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### Other Literature: Articles, Reports from GIS Users

**Ecological regression analysis of environmental benzene exposure and childhood leukaemia: sensitivity to data inaccuracies, geographical scale and ecological bias**. Best N, Cockings S, Bennett J, Wakefield J, Elliott P *Journal of the Royal Statistical Society Series A-statistics in Society* 2001;164:155-174, Part 1. [**Note: See Final Thoughts this edition for other articles on cluster detection appearing in this journal**] Abstract. Benzene is classified as a group 1 human carcinogen by the International Agency for Research on Cancer, and it is now accepted that occupational exposure is associated with an increased risk of various leukaemias. However. occupational exposure accounts for less than 1% of all benzene exposures, the major sources being cigarette smoking and vehicle exhaust emissions. Whether such low level exposures to environmental benzene are also associated with the risk of leukaemia is currently not known. In this study, we investigate the relationship between benzene emissions arising from outdoor sources (predominantly road traffic and petrol stations) and the incidence of childhood leukaemia in Greater

London. An ecological design was used because of the rarity of the disease, the difficulty of obtaining individual level measurements of benzene exposure and the availability of data. However, some methodological difficulties were encountered, including problems of case registration errors, the choice of geographical areas for analysis, exposure measurement errors and ecological bias. We use a Bayesian hierarchical modelling framework to address these issues, and we investigate the sensitivity of our inference to various modelling assumptions. Keywords: Bayesian hierarchical models, benzene, childhood leukaemia, ecological regression, environmental epidemiology, Markov random fields.

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**GIS and geostatistics: Essential partners for spatial analysis**. Burrough PA. *Environmental and Ecological Statistics* 2001; 8:(4)361-377. Abstract. Initially, geographical information systems (GIS) concentrated on two issues: automated map making, and facilitating the comparison of data on thematic maps. The first required high quality graphics, vector data models and powerful data bases, the second is based on grid cells that can be manipulated by suites of mathematical operators collectively termed "map algebra". Both kinds of GIS are widely available and are taught in many universities and technical colleges. After more than 20 years of development, most standard GIS provide both kinds of functionality and good quality graphic display, but until recently they have not included the methods of statistics and geostatistics as tools for spatial analysis. Recently, standard statistical packages have been linked to GIS for both exploratory data analysis and statistical analysis and hypothesis testing. Standard statistical packages include methods for the analysis of random samples of cases or objects that are not necessarily co-located in space-if the results of statistical analysis display a spatial pattern then that is because the underlying data also share that pattern.

Geostatistics addresses the need to make predictions of sampled attributes (i.e., maps) at unsampled locations from sparse, often expensive data. To make up for lack of hard data geostatistics has concentrated on the development of powerful methods based on stochastic theory. Though there have been recent moves to incorporate ancillary data in geostatistical analyses, insufficient attention has been paid to using modern methods of data display for the visualization of results. GIS can serve geostatistics by aiding geo-registration of data, facilitating spatial exploratory data analysis, providing a spatial context for interpolation and conditional simulation, as well as providing easy-to-use and effective tools for data display and visualization. The value of geostatistics for GIS lies in the provision of reliable interpolation methods with known errors, methods of upscaling and generalization, and for supplying multiple realizations of spatial patterns that can be used in environmental modeling. These stochastic methods are improving understanding of how errors in models of spatial processes accrue from errors in data or incompleteness in the structure of the models.

New developments in GIS, based on ideas taken from map algebra, cellular automata and image analysis are providing high level programming languages for modeling dynamic processes such as erosion or the development of alluvial fans and deltas. Research has demonstrated that these models need stochastic inputs to yield realistic results. Non-stochastic tools such as fuzzy subsets have been shown to be useful for spatial analysis when probabilistic approaches are inappropriate or impossible. The conclusion is that in spite of differences in history and approach, the linkage of GIS, statistics and geostatistics provides a powerful, and complementary suite of tools for spatial analysis in the agricultural, earth and environmental sciences. Keywords: geographic information systems, geostatistics, statistical methods, spatial analysis, environmental modeling, map algebra, fuzzy sets.

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**User-Driven Integrated Statistical Solutions**. Wallace ME and Sperling J. *URISA Journal* Fall 2000;12(4):23-31. Excerpts. The Integrated Statistical Solutions (ISS) initiative is an effort to retool our data creation and delivery systems to deliver “integrated statistical solutions” to customers inside and outside the federal government. It focuses on delivering what customers want, not advancing particular program

areas within the government. The term "integration" is relevant on several dimensions; for example: *integrating data and metadata (e.g., geography, headers and stubs, definitions, and methodology); *integrating data across programs and time to make it easier for users to assemble, compare, and analyze time series data; and *integrating internal product design, creation, and delivery systems to speed access of relevant data to customers. An "integrated statistical solution" is an answer to a customer's question, delivered without the customer first having to learn how government programs and/or data files are organized.

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**Interactive Analysis of the Spatial Distribution of Disease Using a Geographic Information System**. Wall PA, Devine OJ. J Geographical Systems 2000; 2:243-256. Abstract. Geographic information systems (GIS) provide a variety of tools for the manipulation and display of public health data. Few, however, enable users to interactively evaluate hypotheses on spatial trends in disease risk that may be suggested by maps of measures of disease impact. We addressed this limitation by developing a seamless interface between a commercial GIS and a suite of spatial analysis algorithms. Users of the system can utilize the GIS's capability to interactively select and manipulate geographically referenced data and, through a series of pull-down menus, apply a variety of exploratory analysis methods to this information. In the presented application, we illustrate this capability by including algorithms for the reduction of random noise in observed incidence rates, for the detection of unusual aggregations of disease events, and for the statistical evaluation of inferences drawn from spatial trends. We demonstrate this application by examining lung cancer mortality in the state of Ohio. Keywords: spatial analysis, mapping, GIS, cluster detection, smoothing.

## *Special Report*

## "Historically Black Colleges and Universities as a Public Health Resource"

**Lee De Cola* USGS and Cynthia Warrick***
**University of Texas School of Public Health**
*Workshop Program Coordinators

Abstract: In 1983 the U.S. Geological Survey (USGS) began a series of annual Historically Black College and University (HBCU) Summer Faculty GIS Workshops that have since exposed well over 250 participants to the latest geospatial data collection and analytical techniques. This paper reviews the history of this activity and highlights its value to minority scientists and communities. We suggest how an increasing Workshop emphasis on environmental public health issues will lead to increased awareness and benefits of GIS technology to minority communities and increased diversity in the field of public health. This activity, now based at Howard University and supported by a wide range of Federal and other agencies, demonstrates the value of HBCUs as an integral community public health resource.

### History of the workshops

There are approximately 118 HBCUs, consisting of public and private institutions, two-year and four-year

**Fig 1. GPS Exercise at Ft. Dupont, DC 1998**

institutions, as well as graduate and professional schools. They are located in fourteen Southern states, six Northern states, three Midwestern states, one Western state, the District of Columbia and the Virgin Islands. These institutions enroll 370,000 students and graduate approximately one-third of all Black students annually with undergraduate, graduate and professional degrees (Na, 1999).

The USGS collaboration with HBCUs

formally started in the 1950s with a program providing Howard University (DC) students with dissertation topics (Hall and Scott, 1991). A specific concern with the recruitment of minorities into the USGS led to a 1983 meeting in Reston Virginia "to discuss the kinds of activities in which the USGS is engaged, areas of mutual interest, seminars for informing faculty of new technology, and employment opportunities." The first such seminar was a small 1-week workshop involving **Grambling State University** (LA) and **Jackson State University** (MS) in 1984.

During the subsequent 15 years the workshops expanded to include more institutions and a wider range of topics. For a number of years the Workshops were conducted at the NASA Stennis Space Flight Center, and they moved in 1993 to **North Carolina Central University**. In 1995, for example, a two-week session included: training in two geographical information systems, global positioning system (GPS) fieldwork, research presentations by participants, presentations of Federal agency staff, and review of grantsmanship ideas. At all Workshops, participants receive at least one GIS software package, as well as other instructional material they can use in research and teaching. A major achievement of the **North Carolina Central University** sessions was the strengthening of that school's Geography Department, which added a Master of Science in Earth Sciences program in 1995.

In 1997 the Workshops were based at the **Howard University (DC) School of Continuing Education** and received financial support from the **USGS, Centers for Disease Control and Prevention (CDC), Agency for Toxic Substances and Disease Registry, Bureau of Land Management, and National Imagery and Mapping Agency**. Other agencies involved in the development of the workshop included CDC **National Center for Health Statistics, Department of Justice, Environmental Protection Agency, Federal Emergency Management Agency, and the Fish and Wildlife Service**. The 1998 Workshop provided the faculty with three types of activities: Structured training in GIS fundamentals, including map analysis and production; GPS field mapping of Ft. Dupont National Park, in a predominantly African American section of the District of Columbia (Fig. 1); and Federal agency presentations on geospatial opportunities.

At the Workshops participants receive extensive training in geospatial technologies. The overriding purpose of the training is to prepare students to return to campus and begin building GIS databases in their home settings. They take proactive roles in designing research projects that use GIS and benefit their students and communities. These Workshops provide training in the fundamentals of geography emphasizing: 1)location-where phenomena occur, 2) scale- the influence of time and space, and 3) environmental correlation- how phenomena can be demonstrated to influence one another (De Cola, 1995). These lessons have an important bearing on understanding public health issues. Roughly 40 hours are spent in classrooms during the week.

The Workshops have evolved with developments in GIS technology. During the 1980s, when remote sensing, GIS, and GPS were relatively new, instruction emphasized the tools themselves. Use of these tools was complex and made difficult by the limited availability of computer platforms. By the early 1990s the focus oriented to three themes: applicability of GIS to the teaching of fundamental geographic concepts (linking models and data to the real world); the role of GIS and the Internet e.g., "Geography in, on, and about the Web"; and use of GIS in environmental science (global change, ecosystem restoration), business (market analysis), and health (decision support).

The following curriculum is an example of the 1999 HBCU Workshop held at the US Fish and Wildlife Service's National Conservation Training Center in Shepherdstown WV. Twelve HBCU faculty daily moved in and out between a well-equipped GIS classroom and a 538-acre campus set for field data collection activities. Students experienced the geography of the real world and how concrete geospatial phenomena are recorded, modeled and analyzed in a GIS. Students become well immersed in a broad range of GIS functionality.

| Day | Topic | Fieldwork |
|---|---|---|
| 1 | Introduction to GIS | Introduction to geography: Location, Map, and World |
| 2 | GIS: Manipulating data, making maps | GPS navigation |
| 3 | Spatial analysis<br>Internet | GPS data collection |
| 4 | Environmental mapping<br>Medical geography | Field mapping |
| 5 | Health applications | Evaluation |

As the Workshops move into the third Millennium we note an increasing focus on the very broad area of the environment, including natural and man-made hazards, human exposures and risks, and community emergency planning and response. This instruction has benefits to the application of GIS to environmental justice, the understanding and control of vector-borne, infectious and chronic diseases, neighborhood health services, and community planning.

## Impact of Workshops

The workshops have led many of the institutions to expand their capabilities in geographical information science and community planning. Here are a few examples:

***Fayetteville State University** (NC) is working with the City of Fayetteville to incorporate GIS into the community information aspects of the City's EPA Brownfields redevelopment grant program. They are designing an interactive Web site where citizens can easily access geographic data pertinent to the three redevelopment sites.

***Tuskegee University** and the **University of Maryland Eastern Shore** were awarded grants to develop GIS Training Centers. Additionally, Tuskegee is providing GIS expertise for the EPA Brownfields program in Pritchard, Alabama.

***South Carolina State University** introduced a new course, "Introduction to GIS and GPS" into their Electric Engineering Technology curriculum, and plan to use GIS in their "Intelligent Farming" project. SC State students in the Technical Communication class used GIS to study the impact of routing foreign spent nuclear fuel from the Charleston Naval Base to the Savannah River Site in Aiken, SC. The results of their study were forwarded to the South Carolina Department of Transportation for assistance with the selection of the most appropriate shipment route.

***Savannah State** has incorporated GIS into two courses, General Parasitology and Urban Health and Hygiene. The students in the Urban health class will develop a GIS to look at teenage pregnancy among African Americans in Chatham county. In the Parasitology course, students will use GIS to study vectors of Dirofilaria immitis and Eastern Equine Encephalitis virus that are known to be endemic in Chatham County. Savannah State has contacted the State of Georgia for access to its GIS database for these courses.

An extension of the HBCU Summer Faculty Workshop is a recently funded public health project that uses GIS as a bridge between local public health departments and six minority health professions schools. With funding through the North American Association for Environmental Education (NAAEE) Urban Collaboratives grant program, the project will assist the following institutions in conducting community meetings to determine what environmental risks in these communities should be addressed: **Howard University College of Medicine**, Washington, DC; **Morehouse School of Medicine**,

Atlanta, GA; **Meharry Medical College**, Nashville, TN; **Xavier School of Pharmacy**, New Orleans, LA; **Drew School of Medicine**, Los Angeles, CA; and the **University of Texas Health Science Center**, San Antonio, TX.

The approximately 118 HBCUs are a broad network of community-based training, technical, and scientific institutions (Fig.2). We have built upon 38 of these schools (labeled squares) in 15 states to form a national force of teacher-scientists who are serving the needs of often disadvantaged communities. Our experience has shown that the Workshops 1) raise the level of technical experience of HBCU minority student-scientists, 2) increase advanced research and placement opportunities for minority professionals, and 3) bring geospatial technology to communities in need of environmental and public health-related study. [Author contacts: Lee at idecola@usgs.gov and

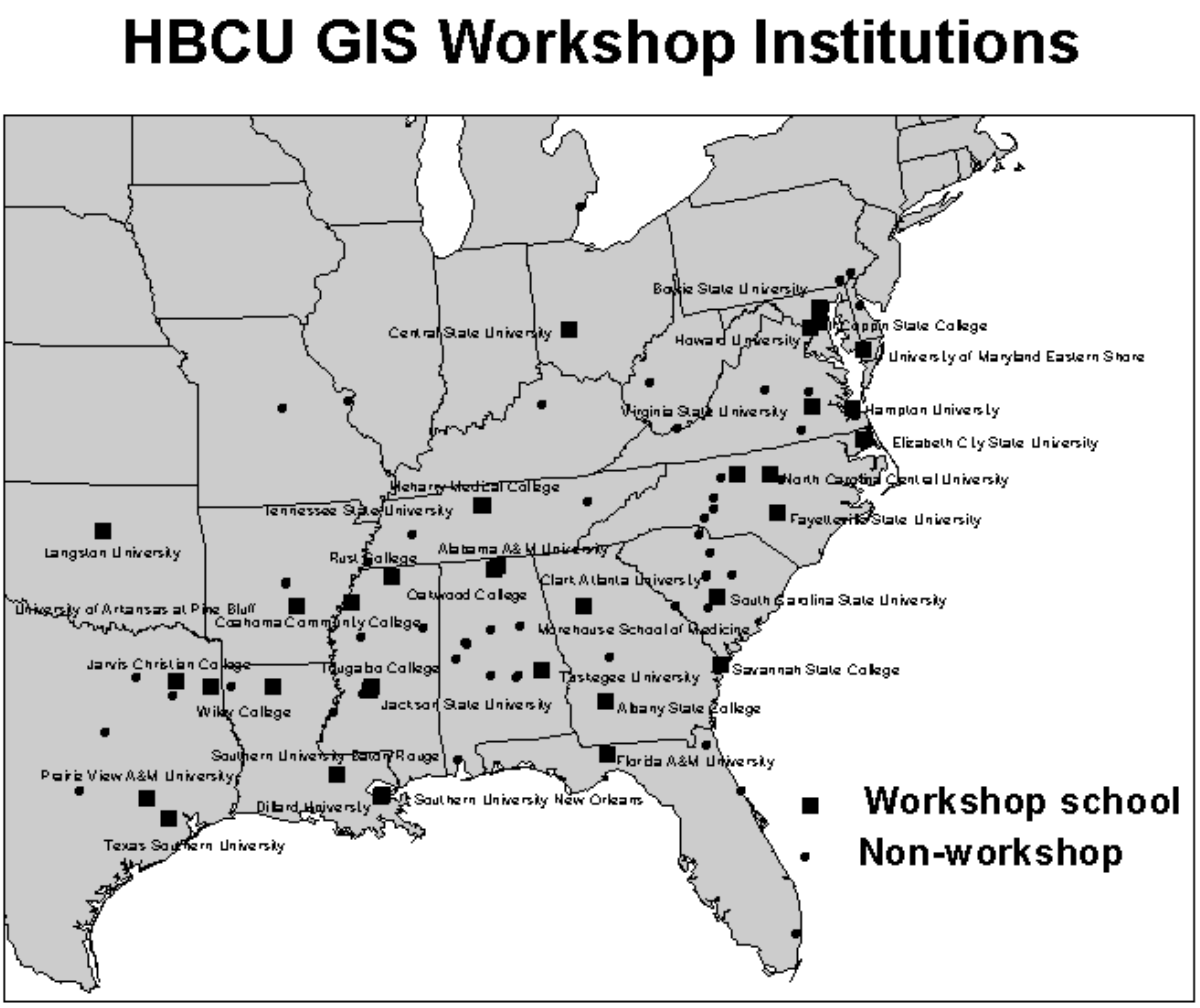


**Fig. 2. HBCU Schools and Workshop Institutions**

Teams made up of health department personnel and medical school researchers will partner to provide local spatial environmental health data that will be put into a GIS so that communities are able to evaluate potential environmental health risks. This project will require that health department, medical school, and community members interact on local public health issues taking a collaborative approach in community health decision making.

Cynthia at cwarrick@sph.uth.tmc.edu]

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## *Special Report*

## Public Health, Interoperability and the Future

**Carl Reed, Open GIS Consortium**

As we've all been reminded in recent months, geography is a key variable for the understanding of disease proliferation, prevention and remediation. However, the role of geography in the understanding of the occurrence and diffusion of many diseases is not new. Some of the earliest known "GIS" applications occurred in the health sciences in the 17th and 18th centuries in London. In these early applications, various socio-economic factors were manually overlaid with incidence data for specific diseases, such as cholera. This allowed the researchers to better understand how to prevent and remediate for a specific contagion.

The forward thinking of these early practitioners is perhaps one reason the health industry-on a global basis-has been willing to embrace a variety of international standards efforts. These standards have been put in place to insure that clinical lab data, statistical data, and other health data can be quickly and effectively interchanged between health organizations, independent of national boundaries and health systems. An excellent example of this type of standard is the International Classification of Disease data model.

Perhaps now is the time to consider how standards from other communities, specifically the geospatial community, can be used with the same effectiveness. Such consideration would also need to incorporate requirements related to patient privacy and in-confidence information. The following paragraphs outline the challenges related to sharing geospatially referenced, or map, data in the health community. They offer some insight into the on-going work of the Open GIS Consortium and how it could be brought to bear to help ameliorate these challenges.

Health professionals face many challenges as they attempt to incorporate geography into the investigation of health issues: integrating mapped data from different research disciplines, databases and communities, different projections, scale, and so on. The problem is exacerbated by the fact that many disparate federal, state, local, and private agencies and groups may be called on to provide map data pertinent to analyzing the etiology and epidemiology of a contagion. It is not realistic to expect each organization to use the same mapping software or data format standard. Indeed, each organization needs to be free to use the data and tools that work best for purpose. Therefore health workers, like their peers in other disciplines, invariably find that it is difficult to combine map data sets created by different organizations using different GIS and mapping software as well as different map naming and data classification conventions.

There is a way to make both the geographic data and the mapping software work together (interoperate). The key forum for spatial interoperability is the Open GIS Consortium (OGC). The OGC vision is: **"A world in which everyone benefits from geographic information and services made available across any network, application, or platform."** OGC develops interface specifications that allow mapping software vendors to build products that work together, both by sharing data and functionality. The good news is that work already completed by

Consortium members can make a significant difference in how GIS can be used in health care and disease prevention.

Working together to agree on interfaces that support geospatial interoperability, OGC members have developed solutions for bringing together map data from many sources on the Web in an easy and meaningful way. For example, instead of only being able to view maps side by side or sequentially, the OGC Web Map Server Specification (WMS) provides a method to query maps from a variety of servers, and using an overlay technique, to build a single map presentation using a single projection. The user can access and view the results directly in a Web browser based application. Thus, data on climate from one server, rainfall from another, transportation routes from a third, and malaria diagnoses from a fourth- can all be brought together regardless of software brand, spatial database, or processing platform. It is also possible to use mapping and GIS applications available on distant servers, perhaps to process raw data using a predictive model, and then return the processed data back to the investigator's computer.

Currently, much medical data is not available in map form. Most medical and/or contagion incidence reports do however include a place description, such as a street address, tying the report to a geographic location. OGC has developed a draft interface specification that supports searching for, discovering, and tying addresses, place names, and landmarks to a map location. In other words, the text document can be referenced to a location on a map. Geographic data once not easily available for spatial analysis is transformed into just that. Consider the quantity of materials currently in the National Medical Library and other collections around the world that may help reveal as yet unrecognized patterns. Obviously, privacy would need to be considered in any applications of this capability to the health industry.

Establishing spatial interoperability within the public health arena lays the groundwork for more effective research as well as for a truly responsive and flexible system available at any time and anywhere for any situation. Consider a vast, virtual collection of health data and services supporting timely spatial, epidemiological, and etiological analysis of diseases available to scientists, health workers, physicians and policy officials. Such a system would be:

-**Software and hardware vendor neutral**- Because OGC focuses on provide interoperability via interfaces, any vendor can easily implement the specification, and users can select whichever software product they prefer.

-**Data neutral**- OGC interfaces allow software vendors tools to make proprietary and open data formats sharable.

-**Web-based**- The Web provides global information discovery and access. It also supports the use of virtual private networks and other security options can be implemented for non-public data. The OGC Web Services Initiative is building a comprehensive framework for Web access to geoprocessing services and data, reducing the need for expensive standalone GIS systems.

-**Timely**- If each organization maintains its own data on a server on the Web, there should be no reason to scramble for data in an emergency.

-**Flexible**- Since there is no way to predict what sort of information may be required, any combination of data can be brought together for examination.

-**Virtual**- Such as system would be available anytime and anywhere.

-**Secure**- It is in the interest of all parties to protect privacy while providing access for professionals through industry-standard security mechanisms.

**This is the vision OGC has for spatial data used in the health sciences**. Clearly, there are long-term benefits: widespread and timely access to data, shared tools for analyses, and unrivaled flexibility. In the short term, the public health organizations and practitioners can begin to explore and plan for interoperability. The first step is to learn about the interoperable geospatial solutions available now and seek them out when purchases are planned. A second step involves participating in the development of requirements that support the evaluation and testing of specifications.

**Merging medically related location data with other social, economic, and environmental data sources is one of the many interoperability**

**issues woven into the current responsibility of the US office of Homeland Security**. That work is further evidence that the time is right to make geospatial interoperability a priority for the health industry. [Contact: Carl, Executive Director, Open GIS Consortium, at http://www.opengis.org]

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

### Health Statistics Vision for the 21st Century

The National Committee on Vital and Health Statistics (NVHS), CDC/NCHS, and the Department of Health and Human Services Data Council (HHSDC) have been engaged in a process to develop the 21st century vision for U.S. health statistics (see process and Interim Report at http://www.ncvhs.hhs.gov/hsvision). The vision will be described as a series of ten system principles (as an infrastructure), each of which will contain specific recommendations. The example of the protection of privacy and confidentiality is described below. The full complement of principles are:

**1) Rigorous policies and procedures for protection of privacy and confidentiality; 2) Sufficient detail at different levels of aggregation for local, state, and national policy and programmatic decision-making; 3) Flexibility and mechanisms to identify and address emergent issues and the health needs of the population; 4) Enterprise-wide planning and coordination to ensure that the health statistics enterprise is relevant to local, state, and national policy and program decision-making, and to an overall conceptual framework for health; 5) Broad collaboration and integration among data users, producers, and suppliers at local, state, and national levels to ensure efficiency and maximum analytic utility; 6) Compatible standards serving multiple purposes to promote data sharing and comparability; 7) Unitary data collection for multiple purposes; 8) Timely production of valid and reliable data; 9) Maximum access and ease of use; and 10) Continuous evaluation of the integrity, accuracy, relevance, and timeliness of health statistics enterprise components.**

### The Principle of Privacy and Confidentiality

(From the Interim Report-Principle No. 1)

**Protecting the privacy and confidentiality of personal health data is of highest importance**

This precondition applies to all other principles. The National Committee on Vital and Health Statistics issued recommendations to the Secretary on the privacy of medical records in mid-1997. The NCVHS recommendations were echoed in those the Secretary made to Congress later that year, and in other Congressional testimony. Then in 1999, the Department fulfilled a HIPAA requirement and issued proposed regulations for protecting the privacy of individually identifiable health information that is electronically transmitted in connection with administrative and financial transactions. NCVHS has offered formal comments on the proposed regulations.

The Committee's 1997 privacy recommendations to the Secretary and the Department's proposed 1999 regulations constitute an important step forward in protecting health information privacy. But additional national and state steps are necessary beyond this initial focus on electronically transmitted administrative and financial data, especially directed toward protecting the privacy, confidentiality, and security of all data used for health statistics.

Necessary protections for the privacy and confidentiality of health statistics data would involve a number of essential factors: adherence to strict new national and state legislation; the use of fair information practices that explicate and control data access, sharing and handling; technical security measures within every organization handling data; sanctions and punishment for misuse and abuse; sophisticated approaches to releasing data to avoid inadvertent disclosure of individually identifiable information; and new approaches to using technology to enable data sharing while protecting privacy. Linkages of anonymized or fully de-identified individual record data, or of aggregated data for small areas, must be done in ways that protect privacy and

confidentiality. Linkages of individual record data must occur within a newly established legal framework, with appropriate human subject review board approval or permission from data subjects.

In general, research is needed to find technological approaches that enable data sharing while protecting confidentiality. At the same time, Americans and their leaders must tackle the difficult questions about the conditions under which the potential benefits to society justify assuming the small risk associated with using information for purposes such as research and public health monitoring.

## Privacy and the Common Good

As a new century begins, Americans are coming to terms with the enormous potential for abuse inherent in modern technology. Information sharing is a two-edged sword: used in the right way and for the right reasons, it can save lives; used in the wrong way or for the wrong reasons, it can ruin them.

Health statistics data are clearly important to communities, public health professionals, health care providers, researchers, the media, and policy makers. For most purposes, these data can be shared in an aggregated form that protects the privacy of individuals. For some clinical and public health purposes, it may be necessary to share individual record-level data under strict procedures for confidentiality. Although the evidence suggests that health statistics systems have done a good job of protecting confidentiality, there is still fear and even some risk that individuals can be identified and their information misused. The greatest concern is that records collected, created, or compiled for statistical purposes might be used to make substantive determinations about individuals or groups by law enforcement, insurers, employers, or others.

The concerns about privacy violations must be taken seriously. At the same time, other important considerations should be recognized: that the confidentiality of paper records is equally or even more in question than that of electronic records, and that information technology actually can be used to enhance privacy protections. Furthermore, if fears about privacy undermine people's willingness to allow even limited access to or use of personal information for important public health purposes, the result can be incomplete information, leading to wrong policy decisions and wrong public health interventions.

A Vision for 21st century health statistics must address all these factors and strike a balance between individuals' desire for privacy and the imperative to improve everyone's health-a need that cannot be met, as we have seen, without information on such things as communicable disease, health hazards, and treatment outcomes. **The issue to be resolved is how we can create adequate protections against inappropriate access and the abuse of personal information while at the same time preserving controlled access for public health agencies, health care providers, researchers, and others who need information in order to care for and improve our health**.

Those with a vision for health statistics agree on the need for a two-pronged approach to this critical issue. First, and most important, the country must have strong national and state legislation that implements fair information practices and establishes strong punishments for abuses. Increased sharing of data is inappropriate without increased protections for the privacy of individuals. In order to allow for increased sharing and linkage of data, we need health statistics privacy laws that prevent individual health statistics records from being accessed and used by police, prosecutors, employers, insurance companies, marketers, and others who might use the data in a way that adversely affects the subjects of the data.

Second, Americans and their policy-makers need to become more aware of the ways in which we all depend on health statistics; and those responsible for health statistics must ensure that health statistics tell Americans what they need and want to know about their health.

[Please note that this emerging vision is based on testimony and input received from the public and others during this process. **Your comments are still invited**. Any suggestions of specific, actionable recommendations that can help to achieve these goals are welcome. This Interim Report and added public comment will form the basis for the final report. Please submit your recommendations to: **Debbie**

**Jackson**, National Center for Health Statistics, at email djackson@cdc.gov or voice (301) 458-4614]

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## 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 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]*

### E-Government Geospatial One-Stop

The FGDC is working on a geospatial information One Stop project that is part of the Office of Management and Budget's new E-government plan that will accelerate federal government improvements in effectiveness, efficiency, and customer service. The strategy, adopted by the President's Management Council (PMC) in October, implements the

***The long-term vision for the Geospatial One-Stop is to revolutionize e-government by providing a geographic component....***

"Expanding Electronic Government" reform outlined in the President's Management Agenda. The FGDC has prepared a draft business case for this project that is available without budget information. A final document has now been prepared. The long-term vision for the Geospatial One-Stop is to revolutionize e-government by providing a geographic component. This project is fundamental to establish the groundwork for this long-term vision. The implementation of the Geospatial One-Stop in the near-term, will standardize the way that geospatial data is collected, accessed, and used to serve as the geographic backbone to spatially enable electronic government services.

Many studies have revealed that about **80-90%** of all government information has a geographic or spatial data component, meaning it can be tied to specific place (for example: **area code, latitude and longitude, street address, zip code**). In 1998, the National Academy of Public Administration estimated that $3.56 trillion is directly related to spatial data. Today there is a wealth of geographic data available

***Geographic information systems (GIS) allow users to integrate, analyze, and manage information about locations in ways never before possible...***

from federal, state, county, local and tribal governments, academic institutions, and private sector organizations. However, it is collected to serve specific missions in different formats and standards, and either poorly documented or undiscoverable. The result is inefficient use of resources, potential duplication, inconsistency, incompatibility, and the inability to maximize the value of its data resources.

Geospatial One-Stop seeks to improve the use of standards and a clearinghouse network across all federal programs. Standards document agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics to ensure that materials, products, processes, or services are fit for their purposes. Through a clearinghouse, users can draw on a single interface to search and access data. A clearinghouse is a distributed network of data producers, managers, and users linked electronically over the Internet. Geospatial One-Stop will demonstrate the economies of scale available by transforming institutional legacies of stove-piped, incompatible spatial data into a robust geospatial solution for e-government. Such co-investments and bulk procurement savings are powerful incentives to make spatial data accessible on the NSDI Clearinghouse network, and to participate in the development of framework standards.

The Federal Geographic Data Committee (FGDC) will lead the Geospatial One-Stop project to build national consensus on standard core content for

framework data themes. This data will be consolidated into the National Spatial Data Infrastructure (NSDI) Clearinghouse network providing a "one-stop" access to FGDC-compliant geospatial data. Interoperability tools will be utilized to migrate current data to the approved NSDI Framework Data standards. A study will be conducted to test and evaluate a web portal, as an extension to the NSDI Clearinghouse network. Based on the results, a comprehensive web portal will be developed and deployed for "one-stop" access to standardized geospatial data. After initial deployment of the comprehensive web portal, reusable, commercial replication services will be required to provide 24X7, trusted data services. [See full report at http://www.fgdc.gov/publications/reports.html]

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**U.S. National Grid Approved**

The Standard for a U.S. National Grid has been approved by the Federal Geographic Data Committee (FGDC). This standard defines a United States National Grid (USNG) intended to serve as the preferred grid system for general purpose mapping applications at scales from approximately 1:5,000 to 1:1,000,000. Technically, it will be the same as the Military Grid Reference System (MGRS), taking advantage of that public domain system's use of the Universal Transverse Mercator (UTM) grid and truncation and variable precision features.

The Standard for a U.S. National Grid provides an unambiguous, geodetically referenced, and mathematically uniform system for specifying a two-dimensional location. It enables the use of large-scale paper and digital maps with Global Positioning System (GPS). Persons using different maps will be able to communicate with each other because they will all use the same grid reference system. In addition, paper maps that use the U.S. National Grid will be easily used in conjunction with GPS receivers. It can be used to supplement conventional street addresses and it will provide a means for specifying location away from the road network.

This standard is not intended to change how coordinates are stored in computers. It is not intended to replace the use of latitude and longitude on nautical and aeronautical charts. It is not intended for use on maps at scales smaller than approximately 1:1,000,000. It is not intended to replace the State Plane Coordinate System (SPCS). SPCS will continue to be used where jurisdictions prefer it for property descriptions, mapping at scales larger than 1:5,000, or other more technical uses such as manual surveying. [See: U.S. National Grid at http://www.fgdc.gov and link with What's New?]

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**Metadata–Don't create your database without it!**

Metadata is information about data, such as content, source, vintage, accuracy, condition, projection, responsible party, contact telephone number, method of collection, and other characteristics or descriptions. Metadata is critical to preserve and protect agencies' spatial data assets. Reliable metadata, structured in a standardized manner, are essential to ensuring that geospatial data are used appropriately, and that any resulting analysis is credible. Metadata also can be used to facilitate the search and access of data sets or geospatial services within a clearinghouse. This would allow state and local governments, many of whom are aggressively using the NSDI Clearinghouse network, to coordinate data acquisition strategies with the federal government, and to manage their data activities more efficiently and effectively. [See site: http://www.fgdc.gov/metadata/metadata.html]

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**Appropriate GIS Coordination Actions to Improve State Response to Acts of Terrorism, Sabotage and Natural Disasters**

On October 31 NSGIC Board of Directors approved a document entitled Appropriate GIS Coordination Actions to Improve State Response to Acts of Terrorism, Sabotage and Natural Disasters to be distributed to each State Representative. The document lists ten appropriate actions that State GIS coordinators can take to more readily deal with terrorism, sabotage and natural disasters (briefly listed below): 1. Read Local Officials Guide, Domestic Terrorism: Resources for Local Governments published by the National League of Cities in 2000, at http://www.nlc.org/nlc_org/site/files/reports/terrorism.pdf; 2. Coordinate with local/ state/federal/private partners to inventory available data; 3. Work with

respective Fire Training Academies, Emergency Management Agencies, FEMA liaison and possible the lead FBI Field Agent to set up mutual aide support and do better inventories of residential and commercial properties (use Bureau of Labor Statistics 208 database to geocode it); 4. Fully enable metadata and the clearinghouse nodes in the next few months; 5. Embrace the FGDC and I-Team standards processes; 6. Adapt all new data production to national standards; 7. Use the ICS model to create special GIS Technical Teams willing to work on emergency operations; 8. Ensure that Internet Mapping sites are secure to cyberterrorism and virus attacks; 9. Ensure that data stays accessible; and, 10. Don't promise more than you should. People won't be prepared for the intensity or duration of events unless appropriately trained. [For more information on Appropriate GIS Coordination Actions to Improve State Response to Acts of Terrorism, Sabotage and Natural Disasters, please contact Bill Burgess at wburgess@dnr.state.md.us]

## Web Site(s) of Interest for this Edition

http://healthyplanet.gsfc.nasa.gov/ [New NASA website]. The Health and Environment Program is a special NASA Earth Science Enterprise and Goddard Space Flight Center program specifically designed to apply remote sensing data and technologies toward better understanding the links between human health and the environment and weather/climate, and to develop powerful new tools for health-related surveillance and early warning systems. A "collaboratory" is being developed where scientists from many different fields can share data and knowledge to help decision-makers address important health-environment issues ranging from infectious diseases to air and water pollution. There are currently indexed research projects (see "Projects") on a number of health problems (e.g., West Nile Virus, Childhood Asthma, African Dust) and new ways are being explored to use NASA's unique space-based assets (see "Examples of Uses") such as satellites, aircraft, the Space Shuttle, computational tools, and data for more rapid problem-solving, early warning, and prevention in global health issues. [Contact: Nancy Maynard, Associate Director, Environment & Health at nancy.g.maynard.1@gsfc.nasa.gov]

http://www.icpsr.umich.edu/NACJD/gis_data.html National Archive of Criminal Justice Data (NACJD). NACJD data collections contain geographic identifiers that could be geocoded for GIS analysis. These data were not necessarily collected for the purpose of mapping or conducting spatial analysis, therefore users may have to do additional work to make these collections compatible with their particular GIS. The list of data collections is organized by type of geographic identifier: FIPS County Codes, Collection-Specific County Codes, Census Tract Codes, Zip Codes, XY Coordinates, and Reference Collections to Link Geographic Identifiers. See also CMRC Survey of Crime Mapping by Law Enforcement for data on law enforcement use of crime mapping in the United States for 1997-1998.

http://www.census.gov/geo/www/cob/bdy_files.html U.S. Census Bureau's Cartographic Boundary Files Web Site. The boundary files available here are selected generalized extracts from the Census Bureau's TIGER geographic database designed for use in a Geographic Information System (GIS) or similar mapping system. They have been developed for various internal Census Bureau projects and have been made available here to the general public on an ***"as is"*** basis. Census Block maps are new. These large scale, large format (36" x 33") maps depict the smallest geographic entities for which the Census Bureau presents data, census blocks. Census 2000 Block maps were produced for American Indian/Alaska Native/Hawaiian Homeland areas, counties, county subdivisions, places and consolidated cities. The maps show the boundaries, names, and codes for American Indian/Alaska Native/Hawaiian Homeland areas, counties, county subdivisions, places, census tracts and blocks. Base feature detail, such as, roads, railroads, and water features are also shown.

http://www.crimereduction.gov.uk/toolkits/fa020405-map1.htm. Hot spots in space and time. Crime and disorder hotspot maps generate a snapshot of events

for a particular period in time. Exploring hotspots in time also helps to understand the patterns and nature of crime in partnership areas. Hotspots in space, may only exist at certain times of day, and give rise to others during other time periods. One way to visualise the geographic and time elements of a crime and disorder is to compose animations. Each ''frame'' produced for the animation is a snapshot of crime or disorder patterns for a particular time period. The linked animation demonstrates how street crime hotspots emerge in certain areas during the course of a typical day in the London Borough of Harrow.

http://www.atsdr.cdc.gov/HS/cluster.html CLUSTER, Version 3.1. To the epidemiologist, especially those working with cancer, birth defects, or environmental and occupational exposures, disease clusters are an enigma. This software is designed to help the researcher determine if there is a statistically significant chance that a cluster occurred other than by random phenomenon. Since the evaluation of disease clusters is a complex task, it is also important that the user have familiarity with cluster investigation and analysis before attempting to use this software. The software includes 12 statistical methods that analyze the significance of a cluster using techniques that evaluate, time, space, and both time and space clustering.

## Final Thoughts: On the Detection of Clusters

We receive many inquiries about cluster detection software for GIS applications. In the last edition (November 2001) of *Public Health GIS News and Information*, a question was posed to readers by Basil Low, Singapore Health Office, that has initiated wide response on the use of cluster detection software. His question was: **"In Singapore, we define a dengue cluster (referring to an outbreak when dengue fever is spreading contagiously from one person to the next) as at least 2 cases (points) within 200 m of each other and within 3 weeks of incidence of each other. With about 2,000 cases so far this year, I have about 80 clusters according to this definition. However, I suspect that the occurrence of some clusters (especially the ones with just 2 or 3 cases) may be by chance, instead of an actual disease transmission happening. How can I test this? Possibly, a Monte Carlo simulation of some kind will help. Is there any software out there that can help to do this? SATScan has got some promising functions, unfortunately it deals with areal or polygon data and not point data (I think)."**

The responses to date for specific software include the following:

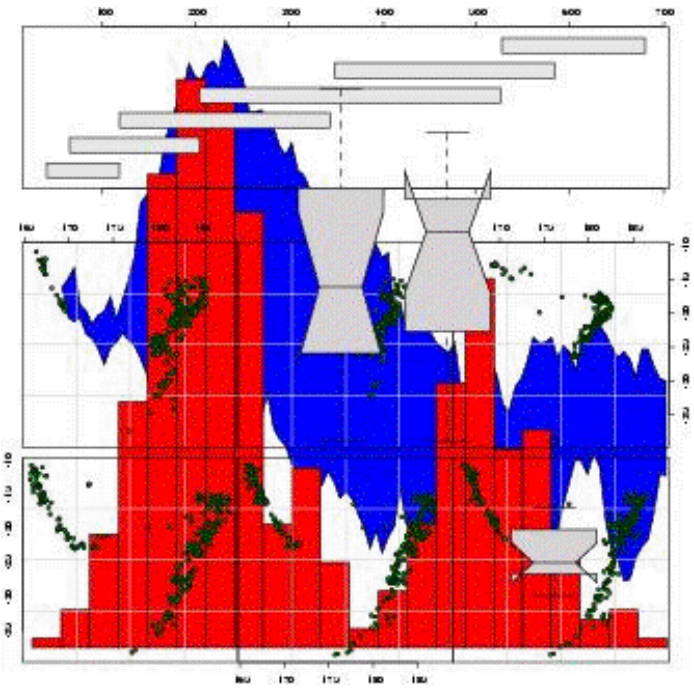
-I would suggest the use of Knox' test that is based on distances. You need no control group to undertake Knox' test. Space-time interaction is tested with the Poisson distribution of pairs of cases near in space and time. The Atlanta CDC distributes the CLUSTER software at no cost. You will find the CLUSTER software at: http://www.atsdr.cdc.gov/HS/cluster.html. [Source: P. Philippe at Listproc@CC.UMontreal.CA]

-I would recommend you have a look at BoundarySeer (http://www.terraseer.com/clusterseer.html) from TerraSerr Inc., a company associated to BioMedWare (http://www.biomedware.com). Although I have not used it myself, it was presented to me in a workshop and I believe it could eventually perform the analyses you need as it contains randomization procedures. Their web site contains probably enough information for you to have a good idea of its potential (see Method Descriptions). [Source: Mathieu Philibert at mphilibert@sfu.ca]

-Spatial-temporal clustering by chance. One possibility are the stkhat family of functions in Splancs, including stmctest-a Monte-Carlo test of space-time clustering, see: Diggle, P.,Chetwynd, A., Haggkvist, R. and Morris, S. 1995 Second-order analysis of space-time clustering. *Statistical Methods in Medical Research*, 4, 124-136. Software to run this in R (www.r-project.org) is contributed as a package to be found on the same site (maintained by me), in S-PLUS at the original site: http://www.maths.lancs.ac.uk/~rowlings/Splancs/. The article is not very easy to get at, a further short description can be found in: Bailey, T. C. and Gatrell, A. C. 1995, Interactive spatial

data analysis. Longman, Harlow, pp. 122-125. A student from Thailand (Wutjanun Muttitanon nungeog@yahoo.com) also drew my attention to an article I think using stkhat: Exploratory space-time analysis of reported dengue cases during an outbreak in Florida, Puerto Rico,1991-1992 Author : Amy Morrison and et al. Journal American Tropical Hygiene ,Vol 58(3) pp287-298. If you follow up this route using the splancs package for R, I'd be very grateful for feedback to help improve its documentation and functionality. [Source: Roger Bivand at Roger.Bivand@nhh.no]

-I think Roger's advice of using Diggle et. al.' s approach for space-time clustering is quite a sound one. The procedure is implemented in R's splancs package (as Roger pointed out). If there is a problem getting the data into R, I am working on a package that I haven't released yet for importing and manipulating geographic data in R, that I could let you use. By the way R is a GNU version of Splus and is free on the internet. There should be no license problems using it at the ministry of the environment. Also, Diggle's approach would help to address Duane Marble's comment of why 200m [e.g., "...And why 200 meters? Why not 195 or 205 or? I keep seeing research proposals that use an arbitrary distance (e.g., 200 meters or one-half mile) without any discussion of where the figure came from...(Source: Duane Marbel at marble.1@osu.edu), because it will give you an estimate of the scale of clustering. [Source: Nicholas Lewin-Koh at nlewin@iastate.edu]



-You're right that the Nnh routine does not incorporate. We're adding some space-time techniques to the next version of CrimeStat, but they are not quite ready yet. For example, the Knox index allows you to test a 2 x 2 table of space and time (close in space v. not close in space; close in time v. not close in time); you can define 'closeness' in any way you want. A second technique is the Mantel index which is a correlation between closeness in space and closeness in time. [Source: Ned Levine, Houston, TX]

-SaTScan used point data (x/y coordinates of either the exact location or the centroid of the area/polygon-of the cases and controls, or case status of the area or polygon (as identified by x/y of the centroid) and population count data for each area or polygon so you should be able to use it. [Source: Marcus (no last or address)]

-Given that you have definitions of a critical distance in space (200m) and a critical distance in time (3 weeks), you could apply the Knox test (sort of the "classic" for this situation). Diggle et al. (1995) provide a more flexible version using K-functions (requiring more involved computation). A few notes on the Knox test: (1) In the discussion of the Knox paper, M.S. Bartlett offers an insightful comment regarding testing for space-time clusters: "Of course, even when one has demonstrated the existence of an interaction (read 'cluster'), say by some such method as he (Knox) suggests, one has, as I remarked at the meeting, to be on one's guard against spurious effects, such as the detection of one case leading to greater efforts, perhaps by a particular doctor, to find further cases in the same locality." (2) The Knox test has an implicit assumption of a constant population at risk, a feature explored and discussed in detail(along with other space-time tests) by Kulldorff and Hjalmars(1999). [Source: Lance Waller at lwaller@sph.emory.edu; Lance cites the following references: Knox, E.G. (1964) The detection of space-time interactions. (with discussion). *Applied Statistics*, 13;25-30; Barlett, M.S. (1964) Discussion of Knox. *Applied Statistics*, 13(30); Kulldorff, M., and Hjalmars, U. (1999) The Knox method and other tests for space-time

interactions. *Biometrics* 55; 544-552; Diggle, P.J., Chetwynd, A.G, Haggkvist, R., and Morris, S.E. (1995)Second-order analysis of space-time clustering. *Statistical Methods in Medical Research* 4;124-136.

-You can test clustering using point data with Spatial-Time scan statistic (SatScan). Using the bernouli model you can run case-control data (using the location of cases and controls). Another way of doing it is to reference your data to some administrative area centroid and using its population as denominator. The great advantage to Spatial Scan statistic, its that SatScan is very easy to use, you only have to set the datafiles in space delimited text files (using Excel or access) choose the parameters and run the model. It will probably find much larger (in space and time) clusters (I guess..) than using your scheme, but will give the significance of this one. You can also use co-variables (in your study (Living near or far from still waters...). [Source: Telmo Pina Nunes at tnunes@fmv.utl.pt]

-It should not be hard to estimate the expected number of chance clusters given the assumption of a uniform distribution of population over space. This could be done theoretically or by Monte Carlo. The problem is if the population is clustered, for example in apartment buildings. It is highly likely that several cases will appear by chance in a large building. Monte Carlo would be a good choice to model this, but you will need a good model of the clustering of the underlying population. This could be obtained by geocoding addresses of a representative sample. [Source: James Blodgett at jrb07@health.state.ny.us]

Appreciation is extended to Basil Low (Basil_LOH@env.gov.sg) whose question began this important dialogue and response. I extend the opportunity for others to send any additional suggestions to me regarding the spatial and space-time analysis of event clusters.

Finally, I wish to call your attention to Volume 164 (issue 1) of the *Journal of the Royal Statistical Society* (Series A Statistics in Society) (2001) on investigating disease clusters (see site http://www.blackwellpublishers.co.uk). Examples of contents include: Wakefield J, Quinn M, Raab G. Disease clusters and ecological studies (editorial).pp. 1-2; Elliott P, Wakefield J, Wakefield J. Disease clusters: should they be investigated, and, if so, when and how? pp. 3-12; Wartenberg D. Investigating disease clusters: why, when and how? pp. 13-32; Steward J, John G. An ecological investigation of the incidence of cancer in Welsh children for the period 1985-1994 in relation to residence near the coastline. pp. 29-43; Kulldorff M. Prospective time periodic geographical disease surveillance using a scan statistic. pp. 61-72; Rogerson PA. Monitoring point patterns for the development of space-time clusters. pp 87-96; and other related topics of possible interest.

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Charles M. Croner, Ph.D., Editor, ***PUBLIC HEALTH GIS NEWS AND INFORMATION***, Office of Research and Methodology, National Center for Health Statistics, e-mail cmc2@cdc.gov. While this report is in the public domain, the content should not be altered or changed. This is the 44th edition with continuous reporting since 1994. The CDC/ATSDR Public Health GIS Users Group now serves more than 4,400 online professionals worldwide.

**Please join us at NCHS on February 12, 2002**

Our GIS Home Page is located at http://www.cdc.gov/nchs/gis.htm