PUBLIC HEALTH GIS NEWS AND INFORMATION

March 2001 (No. 39)

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

I. Public Health GIS (and related) Events

SPECIAL CDC/ATSDR GIS LECTURES

March 15, 2001, "Identifying Immunization 'Pockets of Need' Using GIS and Birth Records," by Jason Devine, Population Estimates Branch, U.S. Census Bureau. This program will be held 2:00-3:30 P.M. at the NCHS Auditorium, **RM1100**, Hyattsville, MD; Envision is available to offsite CDC/ATSDR locations; See abstract 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 GIS and mapping presentations are open to the public. [Contact: Editor, *Public Health GIS News and Information*]

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

☛ Fifth Global Spatial Data Infrastructure Conference, "Sustainable Development: GSDI for Improved Decision Making," May 21-25, 2001, Cartagena, Colombia [See: www.gsdi.org]

☞ Annual Meeting of the Population Association of America, March 29-31, 2001, Washington, D.C. [See: http://www.popassoc.org]

☛ AMIA 2001 Spring Congress, "Developing a National Agenda for Public Health Informatics, May 15-17, 2001, Atlanta, GA [See: http://www.amia.org]

☞ USPS Small Area Conference, "International Conference on Small-area Estimation And Related Topics," April 11-14, 2001. Potomac, MD [See: http://galton.uchicago.edu/~larsen/sa2001]

☛ 50th Annual Epidemic Intelligence Service (EIS) Conference, Centers for Disease Control and Prevention, April 23-27, 2001, Atlanta, GA [See: www.cdc.gov/eis]

☞ 5th Global Spatial Data Infrastructure Conference, "Sustainable Development: GSDI for Improved Decision-Making," May 21-25, 2001, Cartagena de Indias, Colombia SA [See: http://www.gsdi.org/gsdi5/Home.html]

☛ 35th National Immunization Conference, CDC's National Immunization Program, May 29-June 1, 2001, Atlanta, Georgia [See: http://www.cdc.gov/nip/nic]

☞ Western Maternal and Child Health (MCH) Epidemiology Conference, June 14-15, 2001 [See: http://www.cste.org/WesternMCH.htm]

☛13th Annual Convention of the American Psychological Society, June 14-17, 2001, Toronto, Ontario [see: aps@aps.washington.dc.us]

☞ The 21st International Symposium on Forecasting, "The Future of Forecasting, The International Institute of Forecasters., June 17-20, 2001, Atlanta GA [See: http://www.isf2001.org]

☛ The 2001 Annual Summer School of the Society of Cartographers, "2001: A Cartographic Space Odyssey," September 3-6 2001, Leicester, England [See: http://www.geog.le.ac.uk/Conferences/SoC2001]

☞ Urban and Regional Information Systems Association (URISA) 2001 Caribbean GIS Conference, "GIS- The Currency for Modern Governments,"September 9-12, 2001, Montego Bay, Jamaica [See: http://www.urisa.org/2001Caribbean/call forprescar.htm]

☛ Geographical Information Systems (GIS) in Veterinary Science (GISVET), September, 10-13, 2001, Lancaster, England [See: http://www.maff.gov.uk/aboutmaf/agency/vla/topics/gisvet.htm]

☞ 12th Annual CityMathCH Urban Maternal and Child Health (MCH) Leadership Conference, September 17-19, 2001, Nashville, TN [See: http://www.citymatch.org]

☛ Fifth international Conference On Spatial Information Theory, COSIT '01, September 19-23, 2001, Morro Bay, CA [See: http://www.geog.ucsb.edu/cosit01]

☞ 18th International Symposium on Methodological Issues, Statistics Canada- Achieving Data Quality in a Statistical Agency: A Methodological Perspective, October 17-19, 2001, Ottawa, Canada [See: http://www.statcan.ca/english/conferences/symposium2001/index.htm]

☛ 19th Annual Meeting of the Society for Applied Sociology:"Pioneering Applied Sociology in New Practice Frontiers," October 18-21, 2001, Kansas City, MO [See: http://appliedsoc.org]

☞ 52nd Annual Meeting of the Society for Public Health Education (SOPHE), October 19-21, 2001, Atlanta, GA [See: http://www.sophe.org]

☛ 39th Annual Conference of the Urban and Regional Information Systems Association (URISA), October 20-24, 2001, Long Beach, CA [See: http://www.urisa.org]

II. GIS News

(*Please communicate directly with colleagues referenced below on any items*)

A. General News and Training Opportunities

1. From **Jill S. Litt**, Boston University School of Public Health (Call for Abstracts, APHA Annual Meeting- November 2001, Atlanta, GA, Environment Section): The Section seeks abstracts related to the 2001 Annual Meeting theme "Global Health" that highlight relationships between the environment, health, disease and socioeconomic and ethnic/racial factors. The Section is particularly interested in abstracts that integrate these factors in an international setting or context. Abstracts related to global environmental health research; bioterrorism; emerging infectious diseases; climate change and environmental health; population and the environment; social, ethical and cultural issues that impact international environmental health and the challenges associated with the research and practice of environmental health in international settings are encouraged.

While abstracts on any environmental health practice and policy issue are welcome, the Section has particular interest related to four priority areas identified in our Section's 1999 strategic plan: healthy schools; drinking water and pesticides; mercury; and, persistent organic pollutants and the precautionary principle. In addition, topics of interest include: brownfields; community-based environmental health projects; children's environmental health; asthma and the environment; housing; urban sprawl; indoor air and radon; lead; global environmental issues; projects/issues specific to the Southeast and the Atlanta, Georgia area where the Annual Meeting will be held; endocrine disruption indicators, benchmarks, biological markers or other methods of measuring change and impact; food safety; GIS applications; regulatory reform; drinking water, student and new professional sessions; and emerging environmental health problems and creative prevention strategies. [Contacts: Jill at voice (617) 638-4621 or email jlitt@jhsph.edu or Nsedu Obot at voice (202) 543-4033 or email nobot@cehn.org]

2. **GIS and Spatial Analysis: Demographic**

Applications, Annual Meeting of the Population Association of America, March 28, 2001, co-sponsored by George Mason University School of Information Technology and Engineering and David Wong, Department of Geography and Earth Sciences: This day-long workshop will provide an overview of conceptual, methodological and analytical issues associated with the use of GIS-showcasing applications using demographic and social/physical environment data sets. The morning sessions will focus on questions and issues associated with an overview of GIS and a demonstration of on-line GIS resources.

This will be followed by a hands-on session focusing on the use of shapefiles, tables, photographs, images and textfiles in ArcView. Familiarity with Arcview, cartography and data visualization are not assumed. During the afternoon session the focus will shift to topics beyond geospatial data visualization and will be useful for users familiar with Arcview. Specifically, hands-on exercises and demonstrations will cover issues associated with address-matching, deriving new variables, integrating different types of contextual data, integrating ethnographic data, as well as the application of point pattern and area-based spatial analysis within a GIS. The workshop will be mixed format, including short presentations, demonstrations, hands-on lab sessions and discussion time. Over half of the time will be dedicated to hands-on session time. Presenters include Pennsylvania State University staff Stephen A. Matthews, Stephen Graham, Karen Hayslett-McCall, Jim Detwiler (also with World Campus GIS Program) and Michael Stout, Population Research Institute; and Ned Levine, Ned Levine & Associates [See: http://www.popassoc.org/meetings.html]

3. From **Cheryl Corbin**, Wyoming Department of Health: As part of our **BioTerrorism awareness**, we are now posting weekly epidemiology maps on our web site http://wdhfs.state.wy.us/epiid. These maps are intended to give the viewer an idea of what diseases are being reported to the health department and where these diseases are occurring. Anyone can view them through the web site. We have rounds every Monday morning and distribute the map for diseases reported the week before and we discuss anything that looks unusual. Attendees include individuals from the state health department, the local city/county health department and the military base here in town. This isn't a high tech mapping process but it seems to work for now. I am trying to find a way to get a little more clarity for our viewers. I use Maptitude GIS software. [Contact: Cheryl, HIV Surveillance Coordinator, at voice (307) 777-7719 or email ccorbi@state.wy.us]

B. Department of Health and Human Services

Agency for Toxic Substances and Disease Registry

See presentations by ATSDR staff at CDC's February 14, 2001, GIS Grand Rounds program, in item 4.

Centers for Disease Control and Prevention

4. GIS Grand Rounds: Using Spatial Analysis in Public Health Research- This program was held February 14, 2001, at Executive Park, in Atlanta. The titles and presenters follow and the full abstracts may be found in Section IV in this edition. (1) ***Spatial Analysis of the Effectiveness of Premethrin-treated BedNets in Preventing Malaria*** by Allen Hightower, Chief, Data Management Activity, Division of Parasitic Diseases, NCID; (2) ***The GATHER Map Server: Geographic Analysis Tool for Health and Environmental Research*** by Andy Dent, Gather Map Server Development Team, ATSDR; (3) ***Demonstration of MapConsole with DB2Shape Tool (Visual Basic Application)*** by Daniel Shorter, Gather Map Server Development Team, Division of Reproductive Health, NCCDPHP; (4) ***Demonstration of SumAdjacentPolygons Avenue Script*** by Dabo Brantley, Epidemiologist, Division of Reproductive Health, NCCDPHP.

5. From **James T. Wassell**, NIOSH: This is an open call and invitation for papers related to all aspects of **occupational injury risk assessment**. A special issue of *Human And Ecological Risk Assessment* will publish manuscripts related to innovations and development of risk assessment methods to the topic of occupational injury. This special issue is being

sponsored by the National Institute for Occupational Safety and Health (NIOSH) which has selected occupational injury risk assessment as a National Occupational Research Agenda priority. A previous issue of *Human and Ecological Risk Assessment* on Occupational Injury Risk Assessment was published in December, 1998 (Vol. 4, No. 6). The target publication date for this special injury risk assessment issue is the Fall of 2001. [Contact: Jim, Division of Safety Research, at voice 304-285-5894 or email jtw2@cdc.gov]

6. The CDC **National Health and Nutrition Examination Survey** (NHANES) is a unique survey which combines interviews, physical examinations, and laboratory tests, and is conducted by the National Center for Health Statistics (NCHS) in collaboration with multiple other CDC CIOs. The survey examines a nationally representative sample of about 5,000 person each year. This survey will draw part of its 2001 sample from DeKalb County, Georgia from February through April, 2001 and it is possible that households of CDC staff living in DeKalb County may be asked to participate in NHANES. All health information is held strictly confidential. Data collected through NHANES are vitally important and have informed policy and research in many areas, including: identifying elevated blood lead levels in the population and monitoring the decline in those levels as lead was removed from gasoline and other substances; identifying baseline folic acid levels in the population and monitoring the increase in folic acid intake in childbearing-aged women and the corresponding decrease in neural tube defects; providing statistics to assist in determining the prevalence estimates for the American AIDS epidemic, and the distribution of Hepatitis B infection in the U.S. leading to the recommendation of universal vaccination for Hepatitis B; and monitoring the national increase of obesity and overweight adults and children in the U.S. More information about this survey can be found at: http://www.cdc.gov/nchs/nhanes.htm [Contact: Kathryn Porter, M.D. at voice 1-800-452-6115]

7. CDC's National Center For Chronic Disease Prevention and Health Promotion (NCCDPHP) will sponsor the 2001 Cancer Conference, **"Using Science to Build Comprehensive Cancer Programs: A 2001 Odyssey,"** to be held September 4-7, 2001, in Atlanta. The conference will provide participants from a wide constituency of local, state, territorial, federal, national, and community-based cancer prevention and control programs an opportunity to explore science, policy, education, and planning issues as they relate to selected cancers. The conference will further provide program partners an opportunity to share experiences and insights on developing comprehensive approaches to cancer prevention and control. [See: http://www.cdc.gov/cancer/conference2001/#overview]

8. Highlights [selected] of 2000 Accomplishments, NCHS Program Briefing, January 22, 2001: NCHS implemented the **10th revision of the International Classification of Diseases (ICD-10)** for mortality with 1999 data year. Release of the 1999 preliminary mortality report is anticipated in January 2001. Concurrent with the implementation of ICD-10, NCHS will begin using a new age-adjustment standard for mortality. The Year 2000 standard was recommended by a DHHS interagency work group and promulgated by Secretary Shalala for use by all DHHS agencies.

Compressed Mortality File on WONDER- NCHS releases data in electronic format, not only through the NCHS website, but also through WONDER. The Compressed Mortality File (CMF), the most popular data set available on WONDER, is a county-level national mortality and population data file with annual data for the years 1968-98. The mortality file includes information on: State and county of residence; year of death; race (white, black, other); sex; age group at death; and underlying cause of death (4-digit ICD code). The population data are derived from U.S. Bureau of the Census estimates of national, State, and county resident populations. The CMF is used by public health personnel to obtain death rates for local areas and for subgroups of interest. The CMF is also used by researchers to examine geographic variation and trends in mortality. The CMF is also on CD-ROM. [For the briefing report contact Lisa Broitman, Office of Planning, Budget,

and Legislation, at voice (301) 458-4100 or email lcm9@cdc.gov]

9. CDC and Rollins School of Public Health at Emory University will co-sponsor a course, **"Epidemiology in Action"** April 30-May 11, 2001, at CDC and Emory University campuses. The course is designed for state and local public health professionals. The course will emphasize the practical application of epidemiology to public health problems and will consist of lectures, workshops, classroom exercises (including actual epidemiologic problems), and roundtable discussions. Topics covered will include descriptive epidemiology and biostatistics, analytic epidemiology, epidemic investigations, public health surveillance, surveys and sampling, Epi Info 2000 (Windows version) training, and discussions of selected prevalent diseases. There is a tuition charge. Deadline for application is March 1, 2001. [Additional information and applications are available from Emory University, International Health Dept.(PIA), 1518 Clifton Road, N.E., Room 746, Atlanta, GA or voice (404) 727-3485 or visit http://www.sph.emory.edu/EPICOURSES]

10. Editor: A massive earthquake rocked India and the neighboring areas on January 26, 2001. The worst hit area in India was the State of Gujarat where the death toll is feared to reach over 25,000 and is expected to rise. The most affected places in Gujarat are Bhuj, Bachau and the city of Ahmedabad. The epicentre of the quake is near Bhuj. Earthquake maps are available at site http://www.mapsofindia.com/maps/mapinnews/27012001.htm.

Relatedly, the Digital Tectonic Activity Map (DTAM) is a new visualization tool for both researcher and educator alike to better understand tectonic activity of our planet for the past 1 million years. DTAM is a Geographical Information System (GIS) that displays a realistic synoptic view of present global tectonism by filling in the cartographic gap between conventional geological maps and plate reconstruction maps. The DTAM was created using current global datasets of seismicity, volcanism, and plate motions that were integrated with topography and bathymetry measurements derived from satellite gravity data. DTAM is available at http://core2.gsfc.nasa.gov/dtam.

National Institutes of Health

10. From **Ronald P. Abeles**, Office of Behavioral and Social Sciences Research: The National Research Council has released its report **"New Horizons in Health: An Integrative Approach,"** with recommendations for behavioral and social sciences research at NIH. OBSSR commissioned the Committee on Future Directions for Behavioral and Social Sciences Research at the NIH to develop a research plan to guide NIH in supporting areas of high priority in the behavioral and social sciences. The committee recommends 10 priority areas for research investment to integrate the behavioral, social and biomedical sciences at the NIH: Predisease Pathways; Positive Health; Environmentally Induced Gene Expression; Personal Ties; Collective Properties and Healthy Communities; The Influence of Inequality on Health Outcomes; Population Perspectives; Interventions; Methodological Priorities; and Research Infrastructure. The report is available from the National Academy Press at http://www.nap.edu/books/0309072964/html. [Contact: Ron, Office of the Director, at email abelesr@od.nih.gov]

11. **Paula R. Skedsvold**, Office of Behavioral and Social Sciences Research: **Toward Higher Levels of Analysis: Progress and Promise in Research on Social and Cultural Dimensions of Health**, a conference sponsored by the Office of Behavioral and Social Sciences Research, National Institutes of Health (NIH), was held June, 2000, at NIH. The Conference highlighted the contributions of social and cultural factors to health and illness in order to achieve a better understanding of the interdependence of social, behavioral, and biological levels of analysis in health research. The Conference addressed: Sociocultural constructs such as race, ethnicity, SES, and gender; Sociocultural linkages between demographic factors and health; Social/cultural factors in prevention, treatment, and health services; Interpersonal, neighborhood, and community influences on health;

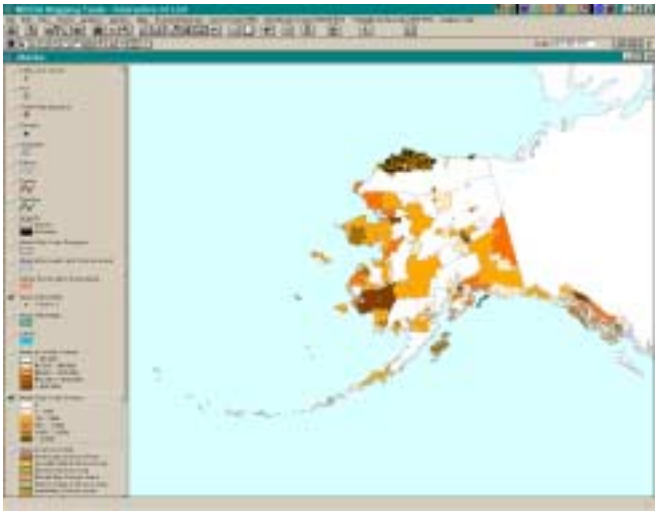
Health justice and ethical issues; and Global perspectives on health. Building on the conference themes, invited experts subsequently met to draft a NIH research agenda. The draft report **"Progress and Promise in Research on the Social and Cultural Dimensions of Health: A Research Agenda"** is now available on-line at http://obssr.od.nih.gov/Conf_Wkshp/higherlevel/conference.html for your public comment until March 15, 2001. [Please send comments to Paula, Office of the Director, at email Paula_Skedsvold@nih.gov]

C. Historical Black Colleges and Universities (HBCUs) and Minority Programs

12. The Henry J. Kaiser Family Foundation and Howard University launched the **DC Congressional Scholars Program in Health Policy** to honor the legacy of former Kaiser Trustee and Congresswoman, Barbara Jordan, by creating opportunities for minority students in health policy and eventually, increasing the numbers of minority health policy professionals. As a member of the United States Congress and the Texas State Legislature, Barbara Jordan's distinguished career was typified by her tireless advocacy of behalf of the disadvantaged. She brought this passion to her work inspiring others to become involved in addressing challenging health policy issues. The Program continues Barbara Jordan's commitment to championing the causes of the poor and disadvantaged by annually providing 10 talented college students from underprivileged backgrounds the opportunity to work in Washington, DC for 9 weeks in a congressional office with major health policy responsibilities. The Scholars will gain exposure to health policy issues and firsthand understanding of how the federal government works. Seminars, lectures, and field trips will augment the work experiences of the Scholars. [See: www.bjcsp.com and students can apply on-line; Contact: Jomo Kassaye at voice (202) 865-4827 or email jkassaye@huhosp.org]

D. Other Related Agency or Business GIS News

13. From **Mario D. Garrett**, Data Analysis Service, Albuquerque, NM (Atlas Development): We have developed a GIS American Indian Health Atlas application. My company is one of four partners who have been developing this capacity. The other partners are; the National Indian Council on Aging, an Indian Organization with 501(c)(3)status, which has headed this initiative for more then six years; the University of New Mexico Earth Data Analysis Center, and CAPE Associates. Summary: The Interactive Atlas on American Indian and Alaska Native Health. Sponsored by the Indian Health Service under a grant through the Elder Health Care Initiative, this five-year project is designed to develop an interactive Geographic Information Systems (GIS)-based Atlas of Indian



Elder Health. The Atlas will expand and enhance the value of IHS data as a national health care resource. While targeting Indian elders, the expanded data will apply to IHS clients of all ages. Utilizing and expanding the IHS data system, the Atlas will track the ten most prevalent diseases affecting Indian elders--portraying them on a national, state, and zip-code levels. The cross-referencing of environmental, socio-economic, geological, health care, and health care cost indices through the use of spatial keys (addresses, zip codes, counties, states, etc.) will result in a valuable national health care resource for Indian Country.

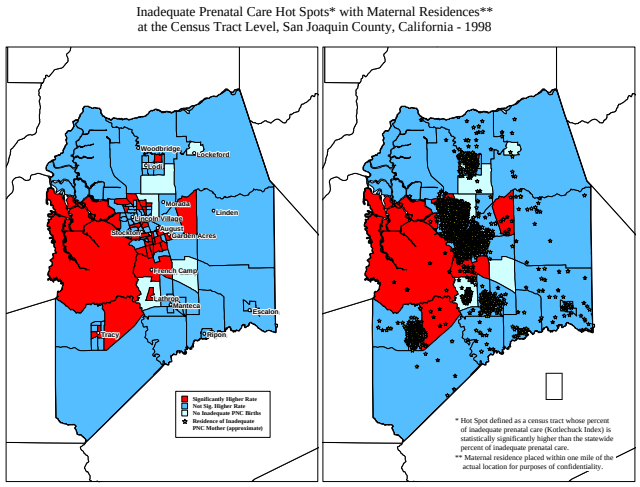
The project has identified and acquired-together with IHS databases (aggregate data for 1997 and Diabetes Audit data for 1997)- additional databases from the Environmental Protection Agency (chemical/nuclear facilities and toxic waste spillages),

National Center for Health Statistics (mortality information), Health Care Financing Administration (HCFA-Medicare and Medicaid for 1995), Bureau of the Census Summary Tapes 1 and 3, U.S. Geological Survey (USGS), Bureau of Indian Affairs (BIA-Reservation boundaries), and Environmental Protection Agency data (EPA-toxic sites). In developing the Interactive Atlas application, the project has now combined these data sources in a computerized Geographic Information System. The application now offers a beta version interactive compact disk with selected data from: IHS patient records (morbidity) for 1997; National Center for Health Statistics (mortality) for 1984-1996; Environmental Protection Agency (environmental factors) most recent; Bureau of Indian Affairs (tribal lands); Census 1990 (demographic); and Geographic data from a variety of sources. The example map is entitled "Circulatory Morbidity for Arctic Slope Native Corporations with Shaded Total AI/AN Populations."

This application offers users the ability to focus on a specific disease (selecting from any ICD-9 code, both from the morbidity and mortality databases) and to portray data down to a specific county, zip code, or Indian Reservation. It also allows for new local data to be added and analyzed. The ability to upgrade data within the application ensures that this system remains viable for the foreseeable future. The Interactive Atlas represents a first concrete, incremental step toward translating national health and demographics data to information that American Indians and Alaska Natives can use. [Contact: Mario, Director, at voice (505) 272-7597 or email marius@unm.edu]

14. From Space Imaging, Denver Co.: Space Imaging has been awarded a license by the **National Oceanic and Atmospheric Administration** (NOAA) to operate a commercial remote sensing spacecraft capable of providing half-meter resolution imagery of the Earth. Space Imaging's next-generation satellite imaging system will provide half-meter resolution black-and-white (panchromatic) and two-meter resolution color (multispectral) imagery. Half-meter resolution means objects on the ground larger than one-half meter in size -or 19 inches- can be seen. One would be able to see such objects as a line of utility poles, a picnic table, large farm animals, small pipelines, individual trees and bushes, and agriculture fields for precision farming. This higher resolution imagery is ideal for precisely mapping utility and telecommunications networks, planning roads and highways, facilities management, national security and other applications requiring a high level of visual and positional detail and accuracy. It is not accurate enough to recognize or identify people. Space Imaging is in the process of defining technical specifications for the new satellite. Launch is anticipated in 2004. [See Space Imaging News Wire at email newswire@SpaceImaging.com]

15. From **Don Taylor**, California Department of Health Services: A new geographic research publication, *Atlas of Prenatal Care Utilization, California 1998*, found that in 1989, only 59 percent of mothers in California received adequate prenatal care. By 1998, partly through enhancements to Medi-Cal coverage, 73 percent of births were to mothers



receiving adequate prenatal care. The entire atlas is available on the web at http://www.dhs.ca.gov/pcfh/mchb/pdfs/PrenatalCareUtilization-1998.pdf. [Contact: Don, Office of Epidemiology, Maternal and Child Health, at voice (916) 657-0324 or at email

dtaylor1@dhs.ca.gov]

16. From **Mac Graham**, Ft. Collins, CO (i-cubed Introduces High-Resolution Digital Map Product for the GIS Market): i-cubed, a geographic data provider in Fort Collins today introduced the Instant Imagery™ USA Millennium Mosaic, the first seamless color satellite image mosaic of the continental United States produced at 15-meter spatial resolution. The USA Millennium Mosaic is composed of over 450 individual Landsat 7 satellite scenes mosaicked into a single image, but clients can purchase portions of the image map by the city, county, or other area of choice. i-cubed is making this digital image map available to the GIS market for use as an accurate and inexpensive basemap for their GIS and automated mapping applications. At 15-meter resolution, areas as small as a quarter-acre are clearly visible in the imagery. [For Instant Imagery USA Millennium Mosaic image samples visit www.i3.com/products/samples]

III. GIS Outreach

[Editor: All requests for Public Health GIS User Group assistance are welcome; 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]

☎ From **Cathleen Hanlon**, NCID: I am a veterinary medical officer in the rabies section at CDC (Atlanta). We are interested in analyzing the occurrence and spread of wildlife rabies. I have taken an introductory GIS course. I have seen the output of GIS from the Department of Environmental Conservation in NY during my tenure there as acting state public health veterinarian. Recently, I have had veterinary students review 2 years of rabies cases from West Virginia. They have hand-mapped the cases (a lot of PO boxes and country roads) and generated longitude and latitude for all points. We now have an excel file with date, long, lat, etc, and would like to look at the potential associations of cases over time, in proximity to waterways, highways, land use features, human populations, etc. We will most likely coordinate this particular project with the Environmental health section of WV. However, in the near future, we may have the capacity to order hardware to conduct the GIS analysis within our group. I am at a loss to identify sufficient computer parameters for this purpose. Would you be able to provide or direct me to a source for a reasonable hardware starting point? Perhaps two examples ranging from minimum to better than average? [Contact: Cathleen, VMD, PhD, at voice (404) 639-1071 or email cfh8@cdc.gov]

☎ From researchers **Tim Uhlenkamp** and **Ioannis Gotzampasopoulos**, Institute of Social Medicine, Beckergrube, Germany (Topic: Hospital Access): We do research in accessibility of health services. Our recent project deals with the regional heterogeneity of hospital access in Northern Germany (Schleswig-Holstein). We would like to measure the accessibility by different indicators like: distance by time; distance on roads (kilometers), distance on costs ($). Which would be the most useful indicator? Do you know any similar studies? Have you heard about any relevant publications? We would very much appreciate information about similar studies, literature and indicators. [Contacts: Tim.Uhlenkamp at email tim uhlenkamp@sozmed.mu-luebeck.de or Isabelle Nuttall, c/o Communicable Disease Surveillance, WHO at voice +41 22 791 3861 or email nuttalli@ who.ch]

☎ From **Matthew C. Nelson**, Rancho Cucamonga High School, CA: I am a student in Rancho Cucamonga, California and am currently on my High School's Science Olympiad team. The project I have been assigned is something called "Disease Detectives." In this competition we are to use various tools of epidemiology to assess an outbreak of an infection, be it real or made up. They do not tell us the assigned situations before hand and they do not provide any examples for us to study. I have searched the internet under epidemiology though have failed to find any site that explains the basics of this complicated art. I was wondering if any Public Health GIS Users can be as kind to give a few good reference sites that would explain at least the basics so I can do well at the competition. We are most interested in what are the most recent outbreaks because they tend to ask questions regarding those. They also tend to ask

things related to the most common types of outbreaks that occur even if there are no recent cases. As well any information on the basic procedures of Epidemiology would be greatly appreciated. I apologize if this letter is any inconvenience though thank you very much for your time. [Contact: Matt at email taranwandering@yahoo.com or class advisor Bernice Sealy at voice (909)989-1600, x2332]

Kathy Radimer, NCHS (early response): There is a section on CDC's website about epidemiology, the disease detectives, and the Olympiad that you mention. There is an entire course on epidemiology on it-although it's not quite as user friendly as it could be-which should give you a very good background (it's geared toward college students, I think, but I hope you can use it). You can find it at http://www.cdc.gov/excite/index.htm. [Contact: Kathy at email kir5@cdc.gov]

IV. Special Reports

Wyoming Utilizes GIS Mapping for Disease Surveillance

Cheryl Corbin, Wyoming Department of Health

The Wyoming Department of Health, Epidemiology Section began mapping of reported diseases in mid-1999. Initially, this activity was limited to the mapping of selected diseases for in-house review by the State Epidemiologist. Over time, it became apparent that this activity could be beneficial to various disease control programs within the Department of Health, as well as to others involved in public health throughout the state.

This project eventually led to the weekly mapping of all reported diseases. These maps were initially restricted for use by Epidemiology Unit personnel but later were distributed during our Monday morning public health rounds. These meetings are attended by various program staff members within the Department of Health, the Department of Agriculture, the local county health officer, and infection control staff from the local air force base. A county health officer from the central part of the state, a representative at the University of Wyoming Veterinary Lab and a member of our bioterrorism preparedness team also participate via teleconferencing.

Suggestions by those involved in pubic health rounds led to the inclusion of zoonotic diseases where transmission to the human population is possible, and environmental incidents reported by the Wyoming Emergency Management Agency (chemical spills, etc.). Dot-density maps are created by mapping each case of disease or reported event randomly within the patient county of residence or county of event occurrence. Mapping occurs at the county level, rather than at the city/town level, in order to protect confidentiality. The result is a clear picture of where diseases/events are occurring within Wyoming. Should it appear that a county has an unusually high number of cases of a certain disease, mapping by the patient's address could be undertaken to determine if a potential outbreak is occurring.

In November 2000, we began posting our weekly and quarterly maps on the Epidemiology Section web site. Our "Epi Maps" section has now grown to include a number of different maps. We are posting quarterly disease-specific maps (food/waterborne diseases, methicillin-resistant staphylococcus aureus, sexually transmitted diseases and zoonotic diseases). Other maps have been added delineating the occurrence of diseases over expanded time periods such as Colorado Tick Fever (1992-1999), E. coli O157:H7 (1996–1999), Human Plague (1978-2000) and Influenza Activity for the 2000-2001 flu season. A map showing the number of children granted immunization exemptions for every school within each county of the state was recently added.

Maptitude Geographic Information System for Windows software is used to create our maps. The Caliper Corporation web site is http://www.caliper.com. To view our maps, go to http://wdhfs.state.wy.us/epiid and click on the "Epi Maps" button. [Contact: Cheryl Corbin, HIV Surveillance Coordinator, Cheyenne, WY at voice (307) 777-7719 or email ccorbi@state.wy.us]

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Technical Talk

MapSheets Express is the free viewing and mapping tool from ERDAS, for working with imagery and vector map data. [See http://www.erdas.com, then

migrate to MapSheets Downloads]. Features include: Bring in data from ERDAS IMAGINE, ESRI's ArcView and Arc/Info, TIFF, JPEG, and now MrSID, as well as Imagery Web Sites like TerraServer [at http://www.terraserver.com]; Multiple view support - have multiple windows open at once; Explore the data with easy-to-use viewing tools, such as dynamic zoom, pan and measure; Make a map in minutes using wizards-and edit the map's contents live on the page; Enhance your map with annotation, text, legends, grids and scale bars; Copy the map to a document-in Microsoft Word, or WordPerfect; Copy the map to a presentation - in Microsoft PowerPoint, and; Save the map in HTML for use on a web site or intranet.

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 online journal is located at http://www.cdc.gov/ncidod/EID/index.htm. The **January-February 2001** issue of CDC's journal, Emerging Infectious Diseases (EID), is now available at website http://www.cdc.gov/ncidod/eid/upcoming.htm. Selected articles include: International Editor's Update-Russia; Pesticides and Public Health; Geographic Range of *Plasmodium vivax*; Flea-Associated Rickettsia Pathogenic for Humans; Active Bacterial Core Surveillance; Trophic Network and Transmission Cycle of *T. cruzi* in the Amazon; Hospital Control and Resistant Tuberculosis in Patients in Peru; West Nile Infection, Volgograd Region, Russia, 1999; *Shigella* spp. Surveillance in Indonesia; Pathology of Fatal Cases of Hand, Foot, and Mouth Disease; Update on National Preparedness for Smallpox. The **November-December 2000** issue includes: Recent Trends in Tuberculosis, Japan; National Epidemiological Capacity in Germany; Lessons from a Full-Scale Bioterrorism; Hantaviruses Infecting Rodents in Northern Greece; Imported Dengue in Buenos Aires, Argentina; and Robins as Reservoir Hosts for Lyme Disease.

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 MMWR online at http://www.cdc.gov/mmwr]- Vol. **50**, No. **7**- Primary and Secondary Syphilis-United States, 1999; Prevalence of Disabilities and Associated Health Conditions Among Adults-United States, 1999; Notice to Readers: Satellite Broadcast on HIV Prevention; Vol. **50**, No. **6**: Mortality From Coronary Heart Disease and Acute Myocardial Infarction-United States, 1998; Notice to Readers: Risk for Meningococcal Disease Associated with the Hajj 2001; Notice to Readers: Publication of Report on Indicators for Chronic Disease Surveillance; Notice to Readers: Epidemiology in Action; Notice to Readers: Satellite Broadcast on Epidemiology and Prevention of Vaccine-Preventable Diseases; Notice to Readers: 2001 Cancer Conference; Vol. **50**, No. **5**- Outbreak of Ebola Hemorrhagic Fever-Uganda, August 2000-January 2001; Evaluation of a Child Sexual Abuse Prevention Program-Vermont, 1995-1997; Vol. **50**, No. **4**- Hypothermia-Related Deaths-Suffolk County, New York, January 1999-March 2000, and United States, 1979-1998; Underdiagnosis of Dengue-Laredo, Texas, 1999; Notice to Readers: Publication of Report on Validation and Use of Measures of Health-Related Quality of Life; Vol. **50**, No. **3**- Serosurveys for West Nile Virus Infection-New York and Connecticut Counties, 2000; Influenza Activity-United States, 2000-01 Season; Circulation of a Type 2 Vaccine-Derived Poliovirus-Egypt, 1982-1993; *MMWR Recommendations and Reports*, Vol. **50**, No. **2**- Health-Related Quality of Life Among Persons With Epilepsy-Texas, 1998; Notice to Readers: Conference on Vaccine Research; Vol. **50**, No. **RR-2**-*Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians;* Vol. **50**, No. **RR-1** Preventing and Controlling Tuberculosis Along the U.S.-Mexico Border: Work Group Report; Vol. **50**, No. **1**- Public Health Dispatch: Certification of Poliomyelitis Eradication-Western Pacific Region, October 2000;

Progress in Development of Immunization Registries-United States, 2000; Recommended Childhood Immunization Schedule-United States, 2001. [Omission from January 2001 edition: Vol. **49**, No. **43**-Great American Smokeout-November 16, 2000; State-Specific Prevalence of Current Cigarette Smoking Among Adults and the Proportion of Adults Who Work in a Smoke-Free Environment-United States, 1999; Update: Outbreak of Rift Valley Fever-Saudi Arabia, August-November 2000; Progress Toward Interrupting Indigenous Measles Transmission-Region of the Americas, January 1999-September 2000; Notice to Readers: CDC Contract for Additional 9 Million Doses of Influenza Vaccine for the 2000-01 Season]

Other Related Presentations and Literature

NCHS Cartography and GIS Guest Lecture Series

March 15, 2001- "Identifying Immunization 'Pockets of Need' Using GIS and Birth Records," by Jason E. Devine, Population Estimates Branch, U.S. Census Bureau. The program will be held at the NCHS Auditorium, 2:00-3:30 P.M., RM. 1100, Hyattsville, MD. Abstract: During 1996 and 1997, the Florida Department of Health's Bureau of Immunization combined the mapping and geocoding capabilities of the Geographic Information System (GIS) ArcView, Florida birth record data, and data from the Florida Survey of the Immunization Levels of Two-year-olds to identify possible immunization "Pockets of Need" (PON). A brief description and map from this project appeared in the March 1999 issue of the *Journal of Public Health Management and Practice* as part of a special issue focus on the use of GIS in Public Health (eds. T. Richards and C. Croner). This project is described in greater detail in a paper entitled "Identifying Immunization 'Pockets of Need' Using GIS and Birth Records" by Jason Devine.

The project involved producing maps for each county in Florida to assist Bureau of Immunization field staff and county health departments in identifying PON and targeting services and outreach efforts. The production of these maps involved several steps. First, three years of data from the annual Florida Survey of Immunization Levels of Two-year-olds, combined with birth certificate and census data, were used to formulate a logistic regression model to predict the probability of a child being fully immunized by age two. This model was then used to assign the probability of being underimmunized to each child in a geocoded data set of all 1996 and 1997 resident live births. These data were then aggregated to predict the number of underimmunized children in each census block group. Finally, the density of predicted underimmunized children was used to identify possible PON.

Improvements in GIS software and data, the increased use of immunization registries, and the availability of Census 2000 data make this timely to reexamine the potential of the techniques used in this project for identifying immunization PON. [Contact: Program chair, Chuck Croner, at email cmc2@cdc.gov]

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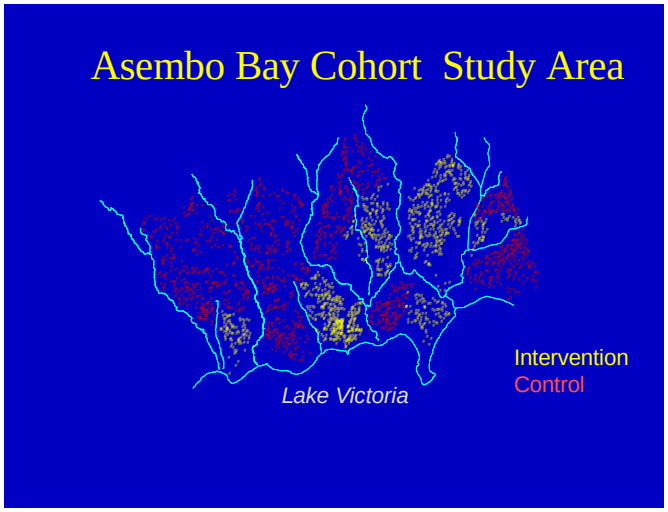
CDC GIS Grand Rounds: Using Spatial Analysis in Public Health Research -Abstracts

February 14 , 2001, Executive Park, Atlanta

(1) **Spatial Analysis of the Effectiveness of Premethrin-treated BedNets in Preventing Malaria**. A large-scale study was conducted in Western Kenya to see if insecticide-treated bednets were effective in preventing malaria and malaria-related mortality in children. The purpose of the spatial analyses are to further explore the effects of the bednets on nearby households that did not have them. [Contact: Presenter



Allen Hightower, Chief, Data Management Activity, Division of Parasitic Diseases, NCID at email awh1@cdc.gov]

(2) **The GATHER Map Server: Geographic Analysis Tool for Health and Environmental Research**. GATHER is an online spatial data access tool that allows public health professionals and members of the general public to access analyze spatial data that is pertinent to the analysis and exploration of public health issues. Several CDC/ATSDR groups have partnered to produce GATHER and a variety of data sets are now online. Using GATHER, CDC's National Center for Chronic Disease Prevention and Health Promotion's Cardiovascular Health Group has published an online version of *Women and Heart Disease: An Atlas of Racial and Ethnic Disparities in Mortality* (http://gis.cdc.gov/cvd). In addition, ATSDR's Spatial Analysis Activities Group has provided access to nationwide data layers including hazardous site boundaries, demography, and base map information such as roads, political subdivisions, and water bodies (http://gis.cdc.gov/atsdr).

Finally, ATSDR's Federal Facilities Information Management System has provided a mapping component for the extensive and powerful FFIMS data analysis and query building application (on intranet only- http://bbs.atsdr.cdc.gov/ffims/home.htm). In the future, several groups including CDC's National Center for Chronic Disease Prevention and Health Promotion's Division of Reproductive Health and CDC's Public Health Practice Program Office will be utilizing GATHER to provide online spatial data access and analysis.

GATHER's wide array of tools, which include pan, zoom, identify, find, and print, provide users with the power to manipulate the mapped area, access the attributes of features, and perform spatial analysis on existing data layers. In addition, future partners may choose to add spatial tools that are pertinent to their data or disciplines. [Contact: Presenter Andy Dent, Gather Map Server Development Team, ATSDR, at email aed5@cdc.gov]

(3) **MapConsole with DB2Shape Tool** (Visual Basic Application). The MapConsole with DB2Shape Tool application was developed for the CARE Tanzania Community-Based Maternal and Perinatal Reproductive Health Project of the CARE-CDC Health Initiative (CCHI). Researchers needed a way to get X-Y coordinates from a Garmin GPS instrument, link them to a database describing reproductive health care in villages in the Mwanza district of Tanzania, and then display them on a map. The MapViewer application with DB2Shape tool was developed using ESRI MapObjects. The objects were then embedded into a Visual Basic framework to deliver them as a stand alone application that imports a dBase, Access or SQL database with X-Y coordinates and converts it to a point shapefile. [Contact: Presenter Daniel Shorter, Gather Map Server Development Team, Division of Reproductive Health, in NCCDPHP, at email zpq4@cdc.gov]

SumAdjacentPolygons Avenue Script. The SumAdjacentPolygons Avenue Script was developed initially for the Reproductive Health Atlas Project of the Division of Reproductive Health (CDC). The script has 2 functions-an interactive selection tool and a summary batch process. The interactive tool can be used to select all adjacent polygons to a prime polygon, or all polygons within a specific distance of any border of the prime polygon. The batch process selects all polygons in a given shapefile 1-by-1 and pulls all adjacent polygons with each prime polygon, counts them, and sums them. The batch process goes on to export a file that includes the polygon matrix by polygon ID, the number of adjacent polygons for each prime polygon, and the sum of each selected demographic field. The batch process can be used to sum variables for spatial smoothing of data, and the interactive tool can be used to select out adjacent polygons such as counties or zipcodes within a given distance of a prime polygon. [Contact: presenter Dabo Brantley, Epidemiologist, Division of Reproductive Health, NCCDPHP, at email mdb4@cdc.gov; Note: Program moderator- Jerry Curtis, NCEH/DEHH at email gbc1@cdc.gov]

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USPS Small Area Conference
International Conference on Small-area Estimation And Related Topics

[April 2001, Potomac, MD- Selected Abstracts: For the complete program see http://galton.uchicago.edu/~larsen/sa2001]

"Combining individual and county-level information in small area estimation: Multilevel hierarchical models with spatial smoothing," Lance A. Waller, Department of Biostatistics, Rollins School of Public Health, Emory University; Haitao Chu, Emory University and Deborah Rolka, Centers for Disease Control and Prevention," Abstract: We explore various hierarchical structures for linking individual survey data with general demographic (census) data from small areas to provide predictions of disease prevalence. We compare general "synthetic" approaches based on applying estimated individual-level covariate effects to small areas based on demographics, to model-based predictions based on individual and area-level effects. We illustrate and compare approaches using diabetes prevalence data from statewide Behavioral Risk Factor Surveillance System surveys, county-specific census covariates, and random effects resulting in "borrowed strength" from the entire state or a subset of spatial neighbors. The model-based predictions follow the synthetic estimates in general, but provide posterior inference in unsampled counties.

"Mapping of Cancer Incidence Rates with Incomplete Covariates," Jonathan L. French, Harvard School of Public Health and Matthew P. Wand. Abstract: Maps depicting the geographic variation of cancer incidence have become useful tools in public health research, giving valuable information about possible environmental exposures. Frequently, these maps plot cancer incidence rates that are adjusted for covariates, such as gender and age. However, such covariate information is often subject to missing values. We propose a method for mapping cancer risk when covariates are not completely observed. Using a mixed effects model representation of a generalized additive model, we handle missing covariate values using the EM algorithm. To illustrate our method, we analyze cancer incidence data for women in Cape Cod, Massachusetts. We produce relative cancer incidence maps, adjusting for age and smoking status, where smoking status is not observed for all patients. These data demonstrate that standard complete-case methods can yield biased estimates of the distribution of cancer risk.

"Prediction of incident cancer cases by county in the U.S.," Linda W. Pickle, National Cancer Institute. Abstract: As part of an ongoing program of methodologic studies to estimate cancer incidence, prevalence, and survival rates at a small area level, we present the results of a multilevel hierarchical model that predicts the number of incident cancer cases expected in each U.S. county. These counts are useful measures of the cancer burden and provide information with which to monitor cancer trends and to plan cancer control activities. In addition, they may be used for quality control purposes, such as to assess completeness of reporting by individual cancer registries. We have modeled age- and county-specific incidence data from 200 counties included in the NCI SEER cancer registry program as a function of age, corresponding mortality rates, sociodemographic and lifestyle factors. Five broad tumor groupings were analyzed for this feasibility project. Regression coefficients from these models were used to predict incidence in non-SEER counties. These models were developed using a random subset of SEER county data, then validated by predicting incidence for the remaining SEER counties, where observed data were available for comparison. Results are more accurate than state estimates published annually by the American Cancer Society. Methodologic issues to be discussed include the development of small-area lifestyle factor estimates from BRFSS data, inclusion of errors-in-covariates terms and extension of the model to include age-period-cohort effects.

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Congress of Epidemiology, June 2001

"Use of Geographic Information Systems in Epidemiologic Field Investigations," Michael Bales, Public Health Informatics Fellow and Andrew Dannenberg, Division of Applied Public Health Training, Epidemiology Program Office, CDC. Abstract: Geographic information systems (GIS) technology has expanded CDC's ability to conduct epidemiologic field investigations. It can reveal spatial and temporal patterns not apparent in conventional

analyses, and allows results to be displayed clearly and convincingly. This paper examines use of GIS in field investigations by the 1999 class of CDC's Epidemic Intelligence Service (EIS) Officers. At a malaria field station in Kenya, GIS was used to generate maps of vaccination probability to describe patterns of missed opportunities for vaccination. At the Republican National Convention in Philadelphia, data were collected on emergency department patients at sentinel hospitals, and GIS methods, including aberration detection, were used for public health surveillance and rapid recognition of potential bioterrorism events. In a Virginia county, GIS was used to describe the distribution of raccoon populations as part of the evaluation of an oral rabies wildlife vaccination program. GIS was used to describe Hepatitis C prevalence in a California county's six health regions, indicating that Hepatitis C is a countywide problem and not confined to one city. Finally, in the New York City metropolitan area, GIS was used to describe the 1999 West Nile Virus outbreak, show changes in endemic areas across time, and select areas for door-to-door serosurveys. GIS methods are now taught to all incoming EIS Officers at CDC because this emerging technology is used increasingly in epidemiologic field investigations. [Contact: Mike at voice (404) 639-4642 or email mbales@cdc.gov]

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In November 2001, the American Society for Photogrammetry and Remote Sensing will devote its issue of ***Photogrammetric Engineering and Remote Sensing*** (PE&RS) to remote sensing and human health. The continued importance of a range of infectious diseases in tropical regions and the resurgence and introduction of new pathogens in temperate areas, result in a significant present, and increasing future problem for the global public health agenda. Against this background, novel and cost-effective control techniques are being continually developed and the government and private sector becoming increasingly motivated towards disease control. These factors lead to an increased impetus to those developing our ability to map spatial and temporal risk of disease so that those interventions that are available may be rationally deployed. It is against this background that the following special issue was conceived. All submissions relating to remote sensing applications in human health will be considered. Of particular interest, however, will be those studies that are developing predictive capabilities for disease early warning. Guest Editors: Simon I. Hay, University of Oxford; Monica F. Myers, International Research Partnership for Infectious Diseases (IntRePID); Nancy Maynard, Goddard Space Flight Centre, NASA; and David J. Rogers, University of Oxford. [Contact: Simon Iain Hay at email simon.hay@zoology.oxford.ac.uk]

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Editor: In the January 2001 edition of Public Health GIS News and Information, I included a selected bibliography on spatial analysis for the forthcoming session **"Spatial Applications in Public Health using GIS,"** annual meeting of the Association of American Geographers, February 27-March 3, 2001. Please add the following two references received from Peter Rogerson, Department of Geography, University at Buffalo, whose presentation is entitled "Assessing the Statistical Significance of Disease Clusters Using Kernel-Based Methods in GIS." Rogerson, P. 1997. Surveillance Systems for Monitoring the Development of Spatial Patterns, Statistics in Medicine, 16: 2081-93, and; Rogerson, P. 2001. Monitoring point patterns for the development of space-time clusters. Journal of the Royal Statistical Society Series A, forthcoming.

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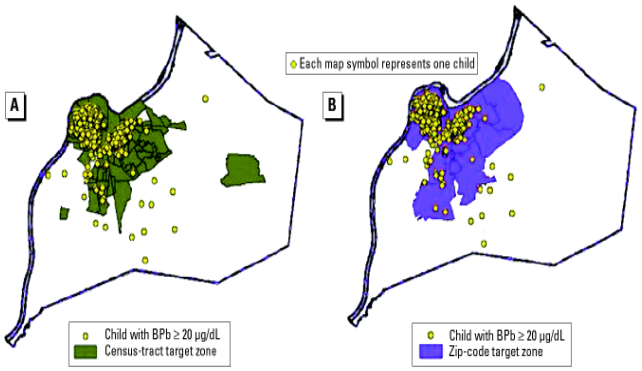
Environmental Health Perspectives (Children's Health Articles) 109(1), January 2001. **"Use of Geographic Information System Technology to Aid Health Department Decision Making about Childhood Lead Poisoning Prevention Activities,"** Dori B. Reissman,[1] Forrest Staley,[2] Gerald B. Curtis,[1] and Rachel B. Kaufmann[1] [[1]Lead Poisoning Prevention Branch, Division of Environmental Hazards and Health Effects, National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta, GA, and [2]Childhood Lead Poisoning Prevention Program, Jefferson County Department of Environmental Health, Louisville, KY]. Abstract: The Centers for Disease Control and Prevention recommend that local public health agencies use local

data to identify children at risk for lead exposure to ensure that they receive preventive services. The objective of this study was to demonstrate the usefulness of a geographic information system (GIS)



in identifying children at risk for lead exposure. We conducted a descriptive study, using GIS technology, of the blood lead (BPb) levels and residential location of at-risk children screened for lead exposure. "At-risk children" were defined as those children living in housing built before 1950 or in an area with a high proportion of older housing. The study was conducted in Jefferson County, Kentucky, USA. Participants were the cohort of children born in 1995 and screened from 1996 through 1997, and children younger than age 7 years who were screened from 1994 through 1998. Outcome measures were the BPb level and residential location (address or target zone) of at-risk children screened from 1996 through 1997, and the number and location of homes where more than one child had been poisoned by lead from 1994 through 1998. The proportion of children screened who live within zones targeted for universal screening varied from 48% to 53%, while only 50% of the at-risk children in the entire county were screened. Between 1994 and 1998, 79 homes housed 35% of the 524 children with lead poisoning. These housing units were prioritized for lead-hazard remediation. Significant numbers of at-risk children throughout the county were not being tested for lead exposure, even in prioritized areas. GIS can be very useful to health departments in planning lead exposure screening strategies and measuring program performance. Key words: childhood, geographic information systems, lead poisoning, public health. See: Environmental Health Perspectives 109:89-94 (2001) at http://ehpnet1.niehs.nih.gov/docs/2001/109p89-94reissman/abstract.html]

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Semenciw RM, Le ND, Marrett LD, Robson DL,Turner D, Walter SD. Methodological issues in the development of the Canadian Cancer Incidence Atlas. Statist Med. 19:2437-2449 (2000). The Canadian Cancer Incidence Atlas is among recent national atlases using incidence rather than mortality data. Methods used to assess the significance and spatial correlation of the age-standardized rates (ASIRs) for the 290 census divisions are described. The expected number of cases by area was used to determine cancer sites with sufficient cases to be mapped. ASIR significance was assessed using a simulation based on a Poisson distribution. The consistency of the observed case distributions with the Poisson distribution was examined. The bootstrap confidence interval (CI) for the ASIR developed by Swift was used in the atlas. Spatial correlation was assessing with Moran's I/Imam and the significance determined by as simulation in order to allow for area population variation. Data quality indicators typically used for cancer registries were presented, supplemented by a registry questionnaire. This atlas represents the first step in the development of a geographic surveillance system, providing data that correlate cancer incidence rates with geographic locations. [To order the Canadian Cancer Incidence Atlas see http://www.hc-sc.gc.ca/hpb/lcdc/bc/atlas_e.html]

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Books and Special Reports

Book Review Excerpts: ***GIS and Health***. Edited by Anthony Gatrell and Markku Löytönen. GISDATA 6. London: Taylor and Francis, 1998. xvii, 212 pp., maps, figures, tables, index. $75.00, hardcover (ISBN 0-7484-07790). The full book review will appear in its entirety in the April 2001 issue of *Cartographic Perspectives*. Appreciation is extended to *Cartographic Perspectives* for the following excerpts

by reviewer Russell S. Kirby, Associate Professor of Clinical Obstetrics and Gynecology, and Medical Geographer, Milwaukee Clinical Campus, University of Wisconsin Medical School. **Excerpts**. This book is a collection of essays result of a symposium sponsored by the GISDATA scientific program of the Standing Committee of Social Sciences of the European Science Foundation, held near Helsinki, Finland in 1996. The sixteen symposium participants were an international group, mostly European with some American participants. The primary goal of the book is to explore the opportunities for applying GIS technology and methodology to the domain of health (p. ix). To that end, the editors have structured the essays in two sections, the first dealing with methodological issues and the second describing a series of health applications for GIS.

Jacquez, for example, chastises users of GIS for health research who adopt the 'gee whiz' approach through the use of GIS to transform spatial data into thematic maps which are then utilized to develop hypotheses, preferring instead that the scientific method remain the basis for the development and testing of research hypotheses derived from GIS-based analyses of health concerns. Haining provides a brief discussion of the types of spatial statistical methods. Of all the chapters in this book, that by Kulldorff on statistical tests for randomness in spatial epidemiology is most able to stand on its own. Rushton's contribution focuses on methods for improving the spatial aspects of public health surveillance using GIS. Rushton and Haining both note that existing GIS applications are insufficient for health research because they fail to bundle the necessary spatial statistical routines with the automated mapping capabilities. The chapter by Collins focuses on methods for modeling spatial variation in air quality. The final chapter in this section focuses on the opportunities for the analysis of time geography and health using GIS [by Löytönen].

The remainder of the book focuses on GIS health applications. López-Abente examines several approaches to the spatial analysis of cancer mortality, while van den Berg shows how population-based health data have been used for small area analysis and point-pattern analysis in western Pomerania. Teppo discusses opportunities for enhancing the analysis of cancer data with GIS, with examples from the Finnish experience. Wilkinson et al. provide an overview of applications of GIS in public health. Fortunately for American readers, the proceedings of the Third National Conference on GIS in Public Health (ATSDR 2000) and two issues of the *Journal of Public Health Management and Practice* devoted to GIS applications in public health (Richards et al. 1999) more than make up for this deficiency. Methods for improving small area estimates of health needs through the use of registries or other population-based databases are discussed by Lovett et al. in the final substantive chapter. [Contact: Russ at voice (414) 219-5610 or email r-kirby@whin.net]

References.

*Agency for Toxic Substances and Disease Registry. Proceedings of the Third National Conference on GIS in Public Health. (Atlanta, GA: Agency for Toxic Substances and Disease Registry, 2000); URL:http://www.atsdr.cdc.gov/GIS/conference98/proceedings.

*Besag J., Newell J. The detection of clusters in rare diseases. *Journal of the Royal Statistical Society* Series A 1991;154:143-155.

*Dever G. E. A. *Improving Outcomes in Public Health Practice: Strategies and Methods*. (Gaithersburg, MD: Aspen Publishers, 1997).

*Marshall R. J. A review of methods for the statistical analysis of spatial patterns of disease. *Journal of the Royal Statistical Society Series* A 1991;154:421-441.

*Richards TB, Croner CM, Novick LF. Geographic information systems (GIS) for state and local public health practitioners, Part 1 and 2. *J Public Health Manag Pract* 1999 Mar;5(2):73-6; 1999 Jul;5(4):1-6.

*Teutsch S.M., Churchill R.M., Editors. *Principles and Practice of Public Health Surveillance*, Second Edition. (New York, Oxford University Press, 2000).

*Wilcox L.S., Marks J. S., Editors. *From Data to Action: CDC's Public Health Surveillance for Women, Infants, and Children*. (Atlanta, GA: Centers for Disease Control and Prevention, 1995).

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Cartographic and GIS Books

Practical Geostatistics 2000, Book and CD by Isobel Clark, William. Harper; *Cartographies of Danger: Mapping Hazards in America* by Mark S. Monmonier; and *Visual Explanations: Images and Quantities, Evidence and Narrative* by Edward R. Tufte.

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Advanced Notice: **"Sharing Crime Maps and Spatial Data:Meeting the Challenges,"** by Julie Wartell and J. Thomas McEwen, Institute for Law and Justice (to

be published soon by the National Institute of Justice). The purpose of this report is to provide guidance on the issues of sharing spatial crime data and crime maps. The target audiences for this publication are law enforcement managers responsible for making decisions about what will be mapped, personnel responsible for mapping, researchers, and website developers. The discussion is intended to help these individuals make well-informed decisions for their agencies and jurisdictions. These are some of the topics addressed: The costs and benefits of providing maps to citizens, other agencies, and researchers; Privacy issues and how to address them; Development of local guidelines for Internet mapping and sharing maps and data; Examples of agencies that have successfully done Internet mapping while safeguarding privacy issues and minimizing liability; The need for disclaimers when providing maps and data on the Internet; Importance of geocoding "hit rates" and the need to disclose them when providing maps, and; Other issues surrounding the availability of maps on the Internet.

Table of Contents includes: **I. The Problem of Crime Mapping and Data Confidentiality; II. Making the Data and Maps Available; III. Maps on the Internet; IV. Sharing Data with Other Agencies; V. Sharing Data with Researchers; Conclusion; and helpful references and appendices.** [Contact: Julie, Senior Research and Technology Associate, Institute of Law and Justice, San Diego, CA at voice (858) 272-4523 or email julie@ilj.org]

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The Spring 2000 issue of the ***Journal of Urban and Regional Information Association*** (URISA) Vol. 12, No 2, is online and devoted to geographic information systems (crime analysis, emergency preparedness, public health and human services, urban and regional planning, water resources, and transportation planning and monitoring). Table of Contents includes: **"Geographic Information Science and Crime Analysis,"** by Arthur Getis, John Gartin, Richard Wright, Pat Drummy, Wilpen Gorr, Keith Harries, Peter Rogerson, and Debra Stoe; **"Application Challenges for GIScience: Implications for Research, Education, and Policy for Emergency Preparedness and Response,"** by John Radke, Thomas J. Cova, Michael F. Sheridan, Austin Troy, MuLan, and Russ Johnson; **"Considerations for Improving Geographic Information Research in Public Health,"** by Gerard Rushton, Gregory Elmes, and Robert McMaster; Application Challenges for Geographic Information Science: **"Implications for Research, Education, and Policy for Transportation Planning and Management,"** by Lyna Wiggins, Kenneth Deuker, Joseph Ferreira, Carolyn Merry, Zhong-ren Peng, Bruce Spear; **"Water Resource Applications of Geographic Information Science,"** by John P Wilson, Helena Mitasova, and Dawn Wright; and **"Geographic Information Science Implications for Urban and Regional Planning,"** by Zorica Nedovic-Budic. This issue also includes two appendices: Appendix A (GIS functions identified by the National Cancer Institute as necessary or desirable functions for the Long Island Breast Cancer Project); and b) a discussion of temporal aspects of GIS and health (e.g., geospatial lifelines and "developing methods to trace locations of individual people (patients, cases, or controls) back through time, to discover spatial clusters in the past or to determine past environmental exposures." [Note: Complete text of Journal articles are in Adobe Acrobat (.pdf) format at site http://www.urisa.org/Journal/protect/Vol12No2/JrnlContents12-2.htm or contact Susan McDonald Jampoler, UCGIS Executive Director, at voice (703) 779-7980 or email execdir@ucgis.org]

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

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2000 Annual Report [Excerpts]
National Science and Technology Council, Office of the President

[Editor: The Office of Science and Technology Policy (OSTP) was established by the National Science and Technology Policy, Organization and Priorities Act of 1976. The National Science and Technology Council (NSTC) was established by Executive Order on November 23, 1993. This cabinet-level council is the principal means for the President to coordinate science, space, and technology policies across the Federal Government. For the full report and accounting of NSTC activities from October 1999 to January 2001, see http://ostp.gov/NSTC/html/nstc_ar.pdf]

Committee on Environment and Natural Resources.

The purpose of the Committee on Environment and Natural Resources (CENR) is to foster and implement a coordinated multi-agency and interdisciplinary focus for Federal environmental R&D. CENR pursues the goals of maintaining biological diversity, protecting and improving air and water quality, reducing exposure to toxic substances, limiting losses from natural disasters, understanding climate change, and providing for sustainable use and management of natural resources. CENR accomplishes its goals largely through the work of its five Subcommittees-Ecological Systems, Toxics and Risk, Air Quality Research, Natural Disaster Reduction, and Global Change Research.

Toxics and Risk. The Subcommittee on Toxics and Risk coordinates research on existing and emerging issues related to toxic substances and their effects on human and ecological health. The Subcommittee sponsors the development of multi-agency research strategies, state-of-knowledge assessments on toxic substances effects, and new initiatives to address important issues that cut across agency programs and interests.

The Subcommittee's Interagency Working Group on Endocrine Disruptors continues to lead national and international efforts to define the scope of the endocrine-disruptor problem, identify areas of scientific uncertainty, and conduct research. In 2000, the group's focus centered on: issuance of a multi-agency research solicitation in the form of a Request for Applications; and discussion and outreach on the international level to develop research partnerships with other governments.

U.S. agencies continue to successfully coordinate their endocrine-disruptor research efforts. A joint solicitation among the National Institute for Occupational Safety and Health (NIOSH), the Centers for Disease Control and Prevention (CDC), the U.S. Environmental Protection Agency (EPA), the National Cancer Institute (NCI), and the National Institute of Environmental Health Sciences (NIEHS) was issued in June 2000. The solicitation was a specific result of identification of research gaps by the IWG, and sought research applications that would investigate the relationships between exposure to endocrine disruptors and adverse health effects, particularly reproductive and developmental effects in humans.

Discussions continue between the U.S. agencies and the European Union (EU) on opportunities for collaborative research programs. In 2001, the IWG plans to examine updating the Global Endocrine Disruptor Research Inventory (GEDRI), for which the EU's Joint Research Center in Ispra, Italy, has assumed overall responsibility; and review the forthcoming IPCS/WHO State-of-the-Science Assessment for endocrine-disrupting chemicals.

The IWG on Mercury was briefed on the National Research Council's (NRC) ***Toxicological Effects of Methylmercur*y**. This July 2000 report was requested by Congress to evaluate data on the health effects of methylmercury, with particular emphasis on most recent human data and to provide recommendations regarding issues relevant to the derivation of an appropriate health benchmark or RfD for methylmercury. The report concludes that methylmercury is a highly toxic substance with particular concern for neurotoxicity, especially in developing organisms. It included specific recommendations for risk assessment grounded in the most recent, thoroughly evaluated human studies. Federal agencies agreed that the study would be helpful in the ongoing effort to update perspectives on risks from methylmercury.

Federal agencies have long recognized the need for better, more-complete human exposure data. When gathered for the U.S. population, such data can help identify new or previously unrecognized hazards related to chemical substances found in the environment, monitor changes in exposure over time, and establish the distribution of exposure levels among the general population. These data can also help identify subpopulations-such as children, low-income groups and ethnic minorities--that might be at increased risk, because they face particularly high levels of exposure. In 2000, subcommittee representatives from EPA, NIEHS and CDC developed a concept paper for an Interagency Human Exposure Monitoring Survey. Based on this report and the General Accounting Office's ***Toxic Chemicals: Long-Term Coordinated Strategy Needed to Measure***

Exposures in Humans (May 2000), the Subcommittee decided that additional, interagency discussions would be beneficial. An existing, informal group–the Research Directors' Forum, composed of the directors of Federal environmental health research programs–continued the discussions at its spring and summer meetings and decided to seek the formal establishment of an IWG on Human Exposure. Steps will now be taken to formally establish such a group including the participation of other Federal agencies and eventually other key stakeholders.

Air Quality Research. Air quality issues continue to be at the forefront of the Nation's environmental agenda. The Air Quality Research Subcommittee (AQRS) serves as a forum for joint research planning and coordination among the Federal agencies engaged in air quality research. The interest and participation by the member agencies is testimony to their commitment to improved communication and enhanced effectiveness and productivity for Federal air quality research.

The Subcommittee's efforts are guided by its 1998 Strategic Plan. The Plan identifies the five most pressing air quality issues facing the Nation as particulate matter (PM) and visibility; ozone and associated air pollutants; acidic deposition; hazardous air pollutants (i.e., air toxics); and indoor air quality.

The Subcommittee's monthly meetings have focused on a series of research themes. As such, the meetings identify key information gaps affecting environmental policy and the development of collaborative programs to provide the needed information. When appropriate, brief white papers are prepared to describe the issue and the underlying science, ongoing and planned Federal research, and gaps in knowledge and capability. These reports are intended as information pieces to guide the development of future Federal research and communicate a joint Federal perspective to agency leadership and outside interests.

The Subcommittee made good progress in 2000 on coordination of particulate matter research. EPA has recently revised the air quality regulations for PM in response to research linking fine-particle exposure to increased illness and death. (Issues related to the PM standards are currently undergoing Supreme Court review.) This problem is exacerbated by the lack of a clearly identified agent responsible for the observed health impacts. The AQRS has been working to foster close linkage among the health-effects, exposure, and atmospheric-research communities. The Subcommittee held several sessions discussing PM research programs in the member agencies, thereby avoiding unwarranted duplication and identifying opportunities for collaboration and cooperation. An inventory of atmospheric PM research in the Federal sector has been prepared and was presented to the NRC Committee on Research Priorities for Airborne Particulate Matter. The Subcommittee has worked to expand the role of the North American Research Strategy for Tropospheric Ozone (NARSTO) to include PM research. The Subcommittee worked through NARSTO and EPA to hold a workshop on PM measurements that brought together the health-effects, exposure, and air-quality communities, for the first time, to jointly develop a coordinated measurement program for PM. This multi-disciplinary effort resulted in specific recommendations for future research directions that are detailed in the report ***Atmospheric Observations: Helping Build the Scientific Basis for Decisions Related to Airborne Particulate Matte*****r**.

Building on the success of the workshop, the Subcommittee established a PM Research Working Group to provide a forum for ongoing communication among the health-effects, exposure, and atmospheric-science research communities. The group is working to craft a national PM research plan that integrates existing agency programs and is guided by the priorities and missions of the individual agencies and the recommendations of the NRC Committee on Research Priorities for Airborne Particulate Matter.

In 1998, the Subcommittee published an inventory of Federal PM research, ***Atmospheric Particulate Matter Research: Inventory of Federal Research Program*****s**. The report provided the impetus for a similar effort (coordinated through NARSTO) in the private sector. The results of both efforts have formed the basis of a comprehensive inventory of PM-related research–both health and atmospheric processes–that is being maintained by the Health

Effects Institute. An accurate catalogue of ongoing and planned research is the first step in the productive integration of existing programs and the joint planning of future efforts. In 2001, the PM Working Group will complete a strategic plan to govern its future direction and provide a framework for discussions.

In the area of atmospheric ammonia, the Subcommittee published ***Atmospheric Ammonia: Sources and Fate - A Review of Ongoing Federal Research and Future Needs*** (June 2000). A white paper on intercontinental transport of air pollution is due for release in early 2001. These reports are part of a series intended to guide the productive integration of Federal air quality research.

The Subcommittee's plans for 2001 call for a review and updating of the Strategic Plan. In addition, the Subcommittee intends to explore several new areas including: · linkages between air quality and climate; air-quality forecasting; and integration of long-term research monitoring .

Natural Disaster Reduction. The Subcommittee on Natural Disaster Reduction (SNDR) is working to coordinate a multidisciplinary and multi-agency suite of research, application, and technology-transfer activities relating to disaster reduction. All SNDR activities are aimed at reducing the loss of lives and the cost of natural disasters to the U.S. economy. Key aspects of this program include improving analytical, modeling, forecasting, prevention, restoration, and information dissemination tools and focusing R&D and emergency preparedness efforts on improving future risk-assessment and risk-management capabilities.

Since 1999, SNDR has sponsored a series of interagency research reviews. The purpose of these reviews is to bring Federal researchers, managers, and policymakers together to review the state of knowledge in specific areas related to SNDR activities, discuss ongoing research programs and management needs, and make recommendations for improved coordination and changes in research focus. Reviews on ***Fire in the Natural and Built Environments*** **and** ***Remote Sensing Applications for Risk and Vulnerability Assessment*** are being finalized. A third review on *Risk Assessment* is planned for early 2001.

In 1998, SNDR and the Institute for Business and home safety established the Private Public Partnership 2000 (PPP-2000) to seek opportunities for government, nonprofit, and private-sector organizations to work together to reduce vulnerability to natural hazards in U.S. communities. PPP-2000 held a series of forums to foster novel partnerships among participants to address natural-disaster-reduction issues. Reports from each forum can be found at: http://www.usgs.gov/ppp2000/index.html. A final report synthesizing the lessons learned is due at the same site. In 2000, SNDR's working group on Natural Disaster Information Systems reported on ***Effective Disaster Warnings*** (http://www.nnic.noaa.gov/CENR/NDI_rev_Oct27.pdf).

The International Workgroup is preparing a white paper on the role of the U.S. government in disaster reduction in the international arena and is also working on a unified strategy. SNDR will continue to work with agencies across the Federal Government to improve coordination of loss-reduction activities, not only in areas of real-time monitoring and warning systems, but also in risk assessment and risk reduction. SNDR will also continue to encourage emerging, public-private partnerships to develop interoperable disaster information and warning systems. In 2001, SNDR will promulgate a revision of its 1996 Strategic Plan at http://www.usgs.gov/sndr/.

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*]

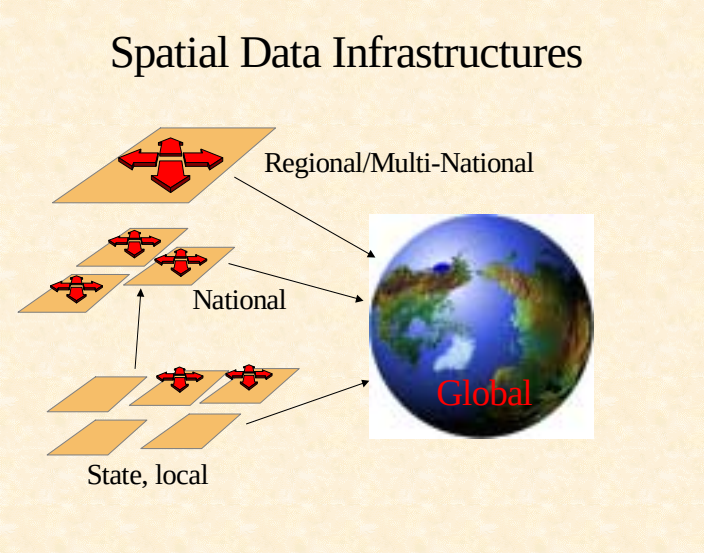
NSDI Community Demonstration Projects

[Final Report-Executive Summary: Excerpts]

The Federal Geographic Data Committee (FGDC)

together with the National Partnership for Reinventing Government and five Federal agencies implemented the National Spatial Data Infrastructure (NSDI) Community Demonstration Projects between July 1998 and May 2000. This collaborative effort demonstrated the utility of geographic data for community decision making, and highlighted the important Federal role in ensuring coordination and guaranteeing access to data resources.

The Projects were designed to: Show how cross-government, cross-functional sharing of geospatial data, maps, expertise, and applications help solve community problems; Support results-driven management practices using timely geographic data; Strengthen efforts to set and implement cross-government, interoperable standards for data sharing; Supply federal expertise to communities for resolving data, policy, standards, and technical issues related to cross-government information sharing; and, Share results of these pilots nationwide.



[Source: John Moeller, Staff Director, FGDC- "The Big Picture Spatial Data Relationships," 5th DE Community Meeting, Pennsylvania State University at Harrisburg, January 31, 2001]

Six communities, reflecting a diversity of geographic areas and community issues were selected for the Demonstration Projects:

*** Baltimore, Maryland** (crime prevention and analysis);
*** Dane County, Wisconsin** (comprehensive land use planning);
*** Gallatin County, Montana** (Smart Growth);
*** Tillamook County, Oregon** (flood mitigation and restoration);
*** Tijuana River Watershed, San Diego California** (environmental restoration); and the
*** Upper Susquehanna-Lackawanna Pennsylvania** (flood mitigation and environmental management).

Businesses, local, state and federal agencies partnered with each of the communities. Each community was paired with a Federal "host" agency and a point-of-contact, "Federal Champion", was identified to work with the community to facilitate their efforts. Additionally, a "Local Champion" was identified through a community selection process to help lead the community effort. The Project's business partner, Environmental Systems Research Institute, Inc. (ESRI), provided each community Geographic Information Systems (GIS) software, training and a support network to resolve technical software and data issues.

The NSDI Community Demonstration Projects showed that partnerships between Federal agencies and local communities help facilitate the use and application of geospatial data and tools enabling communities to make more informed decisions. Through such partnerships, Federal agencies received user feedback on needed enhancements and future directions for the NSDI and Federal data and information resources. The use of geospatial data and visualization tools helps identify competing resources, design planning options, develop risk mitigation strategies and facilitate long-term planning. It provides the capacity to inform and underpin community decision-making and proves to be an effective means to engage decision-makers, stakeholders, and the public at large in community planning efforts. [See full report at http://www.fgdc.gov/nsdi/docs/cdp]

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FGDC February 6, 2001 Coordination Group Meeting Notes

Reminder: The 2001 NSDI Cooperative Agreements Funding Program is now open for submission of proposals. On-line information and application

materials can be found at www.fgdc.gov/funding/cap 2001.html. For more information contact David Painter at (703) 648-5513 or dpainter@usgs.gov. Submission period closes **March 15, 2001**.

U.S. National Grid. The U.S. National Grid for Spatial Referencing Standard defines a United States National Grid (USNG) for use in spatial addressing type applications. It is intended to serve as a preferred system that is easier to use than latitude and longitude by the average citizen. It is intended for use in mapping 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.

This standard is for use in the acquisition or production, either directly or indirectly through contracts and partnerships, of printed maps and the acquisition, either directly or indirectly, of location service appliances. This standard applies to printed maps that are intended to be used or are likely to be used by humans in conjunction with location service appliances and to location service appliances that are intended to be used or are likely to be used by humans in conjunction with printed map products. This standard is not applicable to the collection of geospatial data, either remote sensed data collection or field surveys. This standard is not applicable to the internal data storage structure of any GIS or location service appliance or to the transfer of coordinates between databases or appliances. The USNG is not applicable to surveying. This standard does not attempt to replace the State Plane Coordinate Systems (SPCS) established by the National Geodetic Survey specifically for field surveying. The SPCS is specifically designed to meet the requirements of surveyors and engineers in determining location and boundaries and most states mandate its use by law especially for cadastral surveys. [Coordination Group Action: Approve 90-day public review period for the U.S. National Grid standard; see www.fgdc.gov]

Address Data Content Standard. The Address Data Content Standard will provide semantic definitions for components integral to the creation, maintenance, sharing, usability, and exchange of addresses and/or address lists. Within this scope, addresses are broadly defined as locators to places where a person or organization may reside or receive communications, but excluding electronic communications.

The Address Data Content Standard was developed by the FGDC Subcommittee on Cultural and Demographic Data. The objective of the Standard is to provide a method for documenting the content of address information. The Standard standardizes some commonly used discrete units of address information, referred to as "descriptive elements". It provides standardized terms and their definitions to alleviate inconsistencies in the use of the descriptive elements and to simplify the documentation process. The Standard is applicable to addresses of objects having a spatial component. The Standard does not apply to addresses of objects lacking a spatial component and specifically excludes electronic addresses. The Standard is applicable to shared addresses, and does not require addresses be shared and does not provide guidelines for determining whether addresses can be shared. Some organizations cannot share addresses or some part of address information due to requirements for confidentiality and security. However, the principles of the Standard can be extended to all addresses, including addresses maintained within an organization that are not shared. [Action: Approved 90-day public review period for the Address Data Content Standard]

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FGDC January 9, 2001 Coordination Group Meeting Notes

2001 NSDI Cooperative Agreements Program (CAP). This years' CAP grants will provide seed funds to implement metadata, integrate clearinghouse with web mapping, and promote collaborative framework activities along the US and Canadian border. Proposal submission period closes March 15, 2001. Approximately 1 million dollars is available to support CAP projects in FY2001. All organizations may apply. [Contact: David Painter, FGDC, at email dpainter@usgs.gov].

Framework Survey Clearinghouse Access. Extending the utilization of the NSGIC/FGDC Framework Survey a Clearinghouse search wizard has been established to allow for search on the more than 3,500 survey entries of organizations creating and maintaining framework theme data. A skeletal metadata record at the organizational level was created for each survey entry indicating the theme, area of coverage and contact information. Over time it is hoped that state or regional organizations will take the responsibilities to maintain and expand these entries as complete dataset-level metadata. To use: (1) go to NSDI Search Wizard to "smart-select" servers and data at http://clearinghouse1.fgdc.gov/GDCgateway.html, (2) select topic of interest (a framework theme), (3) define geographic area of coverage, (4) select data servers to search "Framework Data Survey", (5) and optionally refine search criteria. [Contact: Doug Nebert, FGDC, at email ddnebert@usgs.gov]

Geographic Information and Local Governments: Potentials and Pitfalls for NSDI. Report on research findings by Francis Harvey, Department of Geography, University of Kentucky. This research builds on and continues the analysis of the NSGIC/FGDC National Framework Survey focusing on local government in Kentucky. The major findings: more outreach to promote the NSDI and its benefits at the local level is needed, local governments share data and coordinate informally, and that effective data sharing requires levels of trust between the organizations involved. Conformance to external standards was perceived as curtailing local control, however, the modification of those standards for local use increased the sense of local control. Dr. Harvey felt that the Kentucky research could be extrapolated to other states, however, he thought that states would vary due to data theme. [Research report can be found at http://www.uky.edu/AS/Geography/ppnsdi/reports/reports.html]

Web Site(s) of Interest for this Edition

http://www.phrl.org/REGS/ResearchAnalyst.htm *ResearchAnalyst* combines the advanced mapping functionality of ArcView® GIS with the statistical power of S-PLUS®. The S-PLUS for ArcView GIS extension integrates the powerful statistics and publication quality graphics of S-PLUS with GIS techniques available in ArcView GIS. Included in *ResearchAnalyst* is the EpiAnalyst extension for ArcView GIS. The EpiAnalyst is a productivity tool and resource kit for epidemiologic research. The extension contains spatial cluster analysis software from the National Cancer Institute (NCI) and Agency for Toxic Substances and Disease Registry (ATSDR). EpiAnalyst also interfaces with the latest version of EpiInfo 2000 from the Centers of Disease Control and Prevention (CDC).

http://www.phrl.org/free_software.htm Public Health Research Laboratories (PHRL) site where the following software from the federal government may be downloaded for free: Epidemiology Software, Epi Info and Epi Map, from the Centers for Disease Control and Prevention (CDC); GIS Software from the United Nations: PopMap provides the basic elements to develop a simple, but useful geographical information system for thematic and interpretative analysis and presentation; Software from the National Cancer Institute including SaTScan, a program for calculating the spatial and space-time Scan statistic, and; Software from the Agency for Toxic Substances and Disease Registry (ATSDR) featuring Cluster which includes 12 statistical methods that analyze the significance of a cluster using techniques that evaluate, time, space, and both time and space clustering. Other free public health software are available through this site.

http://www.redhensystems.com/mapcalc The CD includes online tutorials and exercises developed by Joseph K. Berry. MapCalc Learner's modeling capabilities are divided into two classes: spatial statistics and spatial analysis. Spatial Statistics tools investigate statistical patterns and relationships among maps: Normality Tests, Point Density Maps, Geographic Trend Analysis, Spatial Interpolation, Spatial Autocorrelation, Residual Analysis, Error Mapping, Coincidence Statistics, Change Surfaces, Comparison Tests, Spatial Correlation and Dependency, Multivariate Regression, Clustering, and

Map Similarity; Spatial Analysis tools derive new maps based on spatial context, patterns, surface configuration, proximity, connectivity and flows: Geographic Search, Weighted Proximity Analysis, Slope and Aspect, Visual Exposure, Optimal Path, Local, Regional & Map-Wide Overlay, Nearby Neighbor Summary, Edge, Shape and Pattern Characterization, Narrowness, Logical, Ranking, Rating and Mathematical Combination, Confluence Surfaces, and Probability and Propensity Analysis.

http://office.microsoft.com/2000/downloaddetails/dmm201.htm Direct Mail Manager is software from Microsoft that incorporates into Microsoft Office. It allows you to input address in almost any form and it will correct common problems and validate those addresses against the US Postal Services ZIP+4 database. Direct Mail Manager uses your Internet connection to check your addresses against the U.S. Postal Service's address database. Verification also adds a ZIP+4 to your addresses. In addition, duplicate addresses can be removed. It even updates the original file with the corrections automatically. You can import your existing address lists from Outlook® contacts, an Access database, Excel worksheet, Word document, text file, and others.

Final Thought(s)

[Please see my attached presentation at the annual meeting of the Council of Professional Associations on Federal Statistics (COPAFS), November 2000, contained in the **Appendix** to this edition]

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.

Please join us at NCHS **March 15, 2001** for the NCHS Cartography and GIS Guest Lecture **"Identifying Immunization 'Pockets of Need' Using GIS and Birth Records."** This presentation will be envisioned to CDC/ATSDR and webcast nationally. Contact: Editor.

Our Web Page is located at http://www.cdc.gov/nchs/about/otheract/gis/gis_home.htm

APPENDIX

Session on "Integrating Geographical Information with Statistical Programs: Challenges and Opportunities"

The Role of Scale

Charles M. Croner, Ph.D., Geographer and Survey Statistician
National Center for Health Statistics, Centers for Disease Control and Prevention

DISCUSSANT

[Appreciation is extended to Edward J. Spar, Executive Director, Council of Professional Associations on Federal Statistics (COPAFS), for kind permission to reproduce the below presentation at the November, 2000, COPAFS annual meeting. Presentations at this meeting, including papers, keynote addresses and formal discussions will be published by COPAFS as an OMB Statistical Policy Working Paper. The COPAFS website is at http://members.aol.com/copafs]

I am pleased to provide Discussant remarks this morning. First, I want to acknowledge the helpful assistance to me of Jimmie Givens, Acting Chief, Statistical Technology Staff, National Center for Health Statistics (NCHS), in the preparation of slides with embedded 3-dimensional dynamic spatial graphics. Second, I wish to thank each of the presenters in this session. They have individually and collectively provided this audience with a timely view of georeferenced data applications at varying spatial scales.

Finally, on behalf of NCHS I wish to extend a warm "Geography Awareness Week" welcome to all. Geography Awareness Week has been commemorated at NCHS since 1988 when it was presidentially decreed. It is a proud tradition and unsurpassed by any other institution of which I am aware. It reflects our view of the importance of the role of geography in strengthening disease surveillance and prevention in public health. I will provide more details about our upcoming program at the close of my remarks.

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Emerging Structure of Spatial Information

Nothing could be more exciting to a professional geographer and survey statistician of 30 years than to be part of what I consider to be the dramatic evolution of digital mapping of georeferenced or spatial data. Advanced Geographic Information Systems (GIS) desktop mapping, supercomputers, and other digital spatial data capture technologies (e.g., Global Positioning Systems (GPS), and satellite and remotely sensed imagery), which until recently were not readily available tools, now provide routinely a multitude of integrated applications using spatial information.

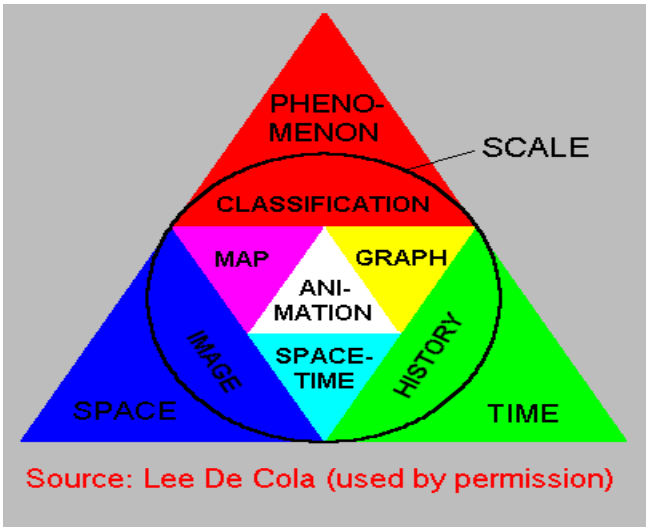
In the past decade, and in response to the proliferation of these spatial data tools, a national model of a framework for describing and qualifying spatial data has emerged. The responsibility for a rational and scientific structuring of thematic or framework national reference spatial data, with its related standards and metadata protocols, has been with the Office of Management and Budget's (OMB) Federal Geographic Data Committee (FGDC).[1] During the past decade, FGDC activities, mobilized and first established a standardized approach among federal agencies to spatial data documentation. It has been beneficial at all levels of government. Moreover, it now has spread to all sectors of our nation. Thanks to FGDC, we are well into the process of developing a National Spatial Data Infrastructure (NSDI).

We face a variety of common challenges (e.g., finance, acquire, document, store, process, share, analyze, maintain, and provide public accessibility) to incorporate NSDI into our respective spatial data collection activities. However, it is well worth the investment: spatial data will increase the value and utility of our data when linked (e.g., through geocoding or coordinate georeferencing of latitude and longitude) and integrated with other spatial data and spatial statistical resources; spatial data terminology and definition, built around uniform FGDC criteria and standards, will promote and facilitate data sharing; data sharing will especially empower local communities in decision making; spatial data is cost-effective and should be viewed as a "capital asset;"[2] and spatial data is the key ingredient that will enable electronic government.

We also know that there will be many challenges governing public use of spatial information. Foremost among these, and particularly among local, state, and Federal governments, are concerns for the individual's right to privacy and confidentiality.[3] Given the advances in computing technology, and the potential to routinely cross reference "n" databases and deduce spatial identification, more than ever we need to insure with certainty protection from personal disclosure. Protective mechanisms to maintain the integrity of spatial anonymity in public databases are beginning to emerge.[4]

Spatial Scale

The challenges and opportunities associated with integration of space and time into our respective data programs begins with understanding the concept of spatial scale. Scale has the properties of extent and resolution. I have borrowed from the work of a colleague geographer and mathematician illustrating (Fig. 1) a paradigm for visualizing these relationships.[5] Topics presented in this session follow a progression of spatial scale. My comments are offered not so much in terms of scale metrics but more with the conceptualization of space. That is, all data we collect, classify and analyze are scale dependent.



Source: Lee De Cola (used by permission)

Global Perspective. Fred Broome's paper, "Accuracy of Geographical Information: The International View," illustrates the influence of spatial scale at a global or international level. If we intend to communicate and exchange spatial information across national borders we need mechanisms in place to insure standards of quality and statistical accuracy associated with georeferenced information. There is growing deployment towards a Global Spatial Data Infrastructure (GSDI). It builds upon the work of the FGDC.

FGDC has taken an active role to help guide other member GSDI nations to adopt a common structure for the collection, storage and sharing of spatial information. The GSDI technical working group, chaired by FGDC, soon will issue a comprehensive "cookbook" on Spatial Data Infrastructures (SDI). Additionally, FGDC recently signed a collaborative SDI agreement with the Netherlands Council for Geographic Information and will sign a formal agreement on SDI for the Americas with western hemispheric nations at the fifth GSDI conference in Cartagena, Colombia in May 2001.[6]

Global Map, another FGDC backed GSDI initiative, will help propel spatial data exchange and spatial statistical analysis at a global scale. It is designed to assist in understanding global environmental changes and will cover the entire earth at 1-kilometer ground resolution e.g., 1:1,000,000 digital format equivalent. It will include thematic map layers of elevation, vegetation, land use, drainage systems, transportation and administrative boundaries.

National Perspective. John Moeller's paper, "Overview of the Use of Geographical Information in Statistical Programs and the Role of the Federal Geographic Data Committee," demonstrates the building and steady deployment of the U.S. National Spatial Data Infrastructure (NSDI). NSDI itself reflects a continuum, from neighborhood to nation, of many spatial data activities. Within the context of FGDC framework and other

thematic spatial data standards, these activities collectively will predispose to invaluable reusable and renewable national digital spatial data resources.

The FGDC theme for digital spatial data, "build once, use many times," is being adopted throughout the nation. For example, at a national scale georeferenced health information from my agency, the U.S. Department of Health and Human Services (DHHS), can be linked and integrated with georeferenced demographic, housing and street network data from the U. S. Bureau of the Census (BOC), georeferenced earth science data from the U.S. Department of the Interior (DOI) and U.S. Geological Survey (USGS), georeferenced air quality and toxic release data from the U.S. Environmental Protection Agency (EPA), georeferenced weather and climatic data from the National Oceanic and Atmospheric Administration (NOAA), and others. Much of this will be accomplished using the World Wide Web (or web) and within the confines of privacy and confidentiality requirements.

Seamless digital data registration e.g., common coordinate transformation of spatial data, will be one of the important developments to support NSDI spatial data exchange and integration. In actuality, there are a variety of distinctly different spatial reference (latitude-longitude) systems used nationally and globally. New and evolving coordinate transformation specifications will allow Open Application Interfaces (APIs) in systems to standardize interoperability, transparent to the user, over the web.[7] This technology will facilitate the vertical and horizontal exchange of spatial data. It will help diminish, and eventually terminate, the institutional stovepipes in which much spatial data still reside. None of this could happen too soon in the area of national emergency response and remediation.

The National Response Center. Captain Mike Egan's presentation, "Emergency Response Information: Guess or GIS,"introduces our nation's National Response Center (NRC). It is a study in spatial scale. Few institutions can rival the immediacy and timeliness needed for spatial data capture, transmission and integration, at all levels of geography, than that of NRC. Our nation's wellbeing depends on it.

In the absence of well-orchestrated geospatial tools "at the ready," we face serious challenges to emergency response and remediation. How effectively could we respond to bioterrorist attacks that deploy anthrax into drinking water supplies? At this time probably not well. As Mike has demonstrated, NRC operations are predominantly paper based including maps of area, industrial and vessel response plans. The bioterrorist attack would require rapid assessment for containment before the pathogenic plumes could displace or be transported. Few response programs today employ real-time dynamic elements capable of forecasting outcomes. The use of GIS and GPS is sparse and not integrated. Radio, cellular and satellite coordination is limited.

The good news is that change is on the way. Technology is converging in the form of new high speed spatial data mining and supercomputing capabilities. The NRC vision for initial response situational analysis and consequence management is to develop a dynamic 3-dimensional geographic spatial data and GIS-GPS correlated framework. Think of it as a dynamic database that can update itself over a supercomputing geographic grid from web-based servers and other types of databases including environmental sensors. Think of it as a system of high speed simulation and modeling of environmental and physical processes, such as surface winds, environmental chemistry, pollutant transport, and other earth science covariates. Then add web-based sampling of the resultant composite display images through compression and exporting via high speed digital datalinks (e.g., using satellite or fiber, wide bandwidth data paths and digital streams) to remote display areas for rapid national, regional and local response.

In fact, NRC has recently launched the collaborative development of the GIS-GPS spatial data infrastructure through the creation of a test bed hosted by the National Center for Supercomputing Applications in Ballston, VA.[8] It is a consortium of federal agencies, and university and industry partners. Two key federal supporters of this plan include the Federal Emergency Management Agency (FEMA) and the National Guard Bureau (NGB). This is a digital government initiative and promises significant involvement from state and local government agencies, the 27 other federal agencies and the American Red Cross that comprise the Federal

Response Plan. The prospects for comprehensive and rapid response emergency management now are part of our NSDI vision and attainable.

Local and Neighborhood Spatial Scales. Debra Stoe's presentation, "Crime Mapping, Privacy, and Data Confidentiality," illustrate's added challenges and opportunities in integrating spatial data at a local scale. This scale is one in which we all have expertise. Although connected to global, national and regional space, we live our lives mainly in small areas, or localities and neighborhoods. Importantly, our ability to build and share georeferenced information at this spatial scale will determine ultimately how robust and soundly NSDI is constructed. Spatial data at these 'grassroots' levels of earth space will support NSDI from a bottom-up approach. This hierarchical design will insure long-term and enduring NSDI success.

In the field of law enforcement, and similar to that of public health, spatial data technology at local levels is being adapted to improve surveillance, detection and prevention. For example, FGDC seed monies for Baltimore's Regional Crime Analysis Geographic Information System (RCAGIS) have resulted in the routine sharing of georeferenced crime data across local police department jurisdictions. In the near future, many police departments will use aerial photography in concert with planimetric data, such as building footprints, as part of automated crime mapping. Inclusion of two and three-dimensional digital orthophotos, of city landscapes, will provide important visualization and metrically precise backgrounds for overlay with GPS-referenced crime events.[9]

Still, law enforcement will confront challenges in just how finite selected local events can be portrayed publicly without compromising the confidentiality or safety of law-abiding citizens. Even in the case of convicted sex offenders (e.g., Megan's Law), where the locations of registered offenders have been made legally public by sheriff's offices and the state, there exists the potential for serious misidentification through maps. Identification errors such as address, address stability, the individual in question, conviction status, and other variables could impact in harmful ways on innocent residents.

Where are we nationally in our community drive toward NSDI? John Moeller has shown there are a growing number of successful spatial data activities which reflect cost-effective investment and sharing among community organizations. Even in the absence of FGDC startup monies, many metropolitan areas have begun to pool spatial data and are well advanced in populating spatial data clearinghouses for public access.[10]

A recent study funded by the FGDC suggests NSDI deployment may be more evolutionary in less urbanized settings.[11] Based on the overwhelming majority of counties in Kentucky e.g., those with populations of less than fifty thousand, NSDI relevance and potential was found to be more related to issues politicians can take to the voters. For example, hydrant mapping might translate into lowered fire insurance rates for residents located within a specified buffer of a hydrant. Additionally, state interest may promote a particular spatial theme, such as hydrology, when it serves an immediate need.

If these less urbanized counties are representative of other similarly populated U.S. counties, NSDI will be challenged to communicate its relevance as a model for local communities. Perhaps the key to insuring NSDI community-level success is the continuing guidance and assistance in geocoded data development. For example, in the case of state geocoding practices of public health vital records, less than half of the 49 registration areas responding to a 1997 survey were involved in automated geocoding of address data. However, nearly all of the registration areas that did not geocode were interested in developing this capability.[12] Opportunities do exist to educate and support these jurisdictions in areas of metadata, technology, training and other spatial data infrastructure needs.

Spatial Data Analysis

Briefly, the analysis of spatial data has its unique challenges. A major challenge is to derive inferences from data that exhibit multiscale dependencies. A GIS framework provides a flexible framework in which to measure patterns of spatial dependence e.g., spatial autocorrelation in which the likelihood that properties of

spatial observations close in space are more alike than those further apart.[13] In the examination of multiscale spatial dependencies, "geostatistical techniques allow us not only to conduct analysis across a range of scales, but also to model spatial heterogeneity and re-scale both the data and the model to allow integration."[14]

For example, "converting point environmental measurements into a continuous thematic surface provides, through a statistically representative sampling of data points or grids, a direct basis for hypothesis generation."[15] Geostatistical techniques, e.g., kriging,[16] can help predict the best linear unbiased estimates from sampled values and extend the analytic value of your data. In a GIS, a kriged surface of data values could accommodate added integration with other spatial databases and predicted surfaces, of suspected or related covariates to further refine models of disease risk.

Two examples in my presentation illustrate these concepts. The first, dependent of administrative or census boundaries, showed autoregressive integrated moving average (ARIMA) or temporal forecasting of Lyme disease case time series reported at the state level. This model was found to be more sensitive to fluctuations in the data than other models. It provided expected cases and standard errors forecast into the future. Kriging, a spatial interpolation method, was than applied to the data at the centroids of each state.[17] The resulting national map, a cross product of both measurements, reflected continuous predicted and interpolated surfaces where hue indicated expected incidence and saturation uncertainty.

The second illustration, independent of administrative or census boundaries, depicted simulated real-time volumetric pollutant transport plume data, at a specific point location. Through the use of kriging techniques, both of the plume concentrations (at this hypothetical industrial site) honored the measured data samples with variations occurring in the regions between samples.[18] Additional samples e.g., cost, would have produced less variation. A confidence level (80 percent) was selected that took into account the toxicity of the contaminants, the location of the plume relative to the water table, wells, and many other factors. These confidence levels were used to compute the volumetric variation of predicted minimum and maximum values.

This particular example of large scale or localized variation produced a variogram[19] described as a surface in three-dimensional space. Major and minor axis variogram parameters were determined and these were blended together in the between regions. The resulting multi-dimensional variogram was capable of better representing anisotropies or trends in the data such as a ground water plume being driven by a distinct flow direction.

This example lends itself to the emergency response and remediation situation discussed previously. I think it apparent environmental safety in the future will necessitate strategically placed sensors at all potentially hazardous locations, for real space-time monitoring of toxic containment, release and remediation.

Concluding Remarks

The presentations this morning provide insight into the integrating role of spatial scale in nearly all of our geospatial and related statistical program activities. The proliferation of digital georeferencing technologies and spatial databases has necessitated a blueprint for standardized spatial data definition and exchange. The FGDC is providing us national and global leadership that will contribute towards a coherent and cost-effective spatial data infrastructure in the Twenty-First century. Perhaps the most challenging issue in the U.S. is developing NSDI at its base--within local communities.

We also have reviewed some of the challenges associated with the analysis of scale dependent spatially referenced information. Geostatistical tools allow for the modeling and integration of multiscale spatial dependencies. Although there exist a variety of spatial data smoothing and interpolation techniques, the kriging method demonstrates a lack of constraint by administrative borders, missing values can be reasonably predicted, and the variance of estimated values and their standard errors can be mapped.[20]

Please accept a warm NCHS invitation to join us for our 13th annual celebration of Geography Awareness Week. A special presentation, "Gateway to the Earth," will describe a new system for accessing, integrating,

managing, and delivering the spatial data information assets of the USGS to a wide range of public and policy uses. I hope you can be part of this very special NCHS tradition.

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8. See: National Response Center at URL http://www.nrc.uscg.mil/index.htm; also related activities of the new Multi-Sector Crisis Management Consortium at URL http://www.ncsa.uiuc.edu/mscmc and new Global Disaster Information Network (established by Executive Order, April 27, 2000) at URL http://www.gdin.org.

9. Harries K. Mapping crime: principles and practice. Crime Mapping Research Center. Grant NCJ 178919, National Institute of Justice, U.S. Department of Justice 1999 and on the web at URL http://www.ncjrs.org/html/nij/mapping/pdf.html; Note: Digital orthophotoquads (DOQs) are computer images of aerial photographs that have been corrected to have the same properites of a map. In a GIS, DOQs can provide a detailed image base layer of information and distances can be measured extremely accurately.

10. See examples: Washington Geographic Information System Consortium (Washington, D.C. Metropolitan Area) at URL http://www.wgis.org, an established network of federal, District, and private-sector partners who develop and share spatial databases; Open GEodaTA Consortium (Atlanta Metropolitan Area) at URL http://www.ogeta.com/consortium/about.html, which initiated a sixteen-county Metro Atlanta spatial information utility based on high-resolution seamless digital orthophoto coverage, the first leading project of this magnitude in the US; and SanGIS (City and County of San Diego) at URL http://www.sangis.org/sangis/about.html, whose mission is to maintain and promote the use of a regional geographic data warehouse for the San Diego area and to facilitate the development of shared geographic data and automated systems which use that data.

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