EPA-742-B-98-006

Geographic Information Systems, Pollution Prevention Case Studies

The *Geographic Information Systems, Pollution Prevention Case Studies* provide examples of innovative geographic information systems (GIS) programs with pollution prevention applications. Programs were selected based on pollution prevention results (or potential) as well as for the complexity of the GIS project. The case studies are designed to give an overview of GIS programs with varying amounts of time and money required and include fairly simple (Needham), middle of the road (Lincoln-Lancaster), and fairly complex (Reno) applications.

These case studies were developed as a companion to NACCHO's *GIS, Pollution Prevention, and Public Health* guide which provides introductory information on GIS, potential pollution prevention applications, suggestions for launching a GIS program, and resource lists.

Community Septic Management Program, Geographic Information Systems Project

By Fredric Cantor, D.V.M., M.P.H.

Description of Jurisdiction

The Town of Needham (MA) is a middle class suburban community 10 miles west of Boston with a population of approximately 28,000 and 10,000 dwelling units. The Needham Board of Health is a three person elected board, with staggered terms, that oversees the administration of the Needham Health Department. The health department consists of a health director (1.0 full-time equivalent (FTE)), public health nurses (1.25 FTE), the Traveling Meals Program coordinator (0.66 FTE), an environmental health agent (1.0 FTE), and an administrative assistant (1.0 FTE), with an annual budget of approximately $300,000.

Project History

In FY97, The Massachusetts Department of Environmental Protection (DEP) awarded the Board of Health a $20,000 grant to develop an on-site sewage treatment and disposal system (septic system) management and loan program. The primary goal of the Community Septic System Management

Contents

Program was to prevent pollution to municipal water wells and surface water from failing septic systems by providing voluntary incentives for inspecting and upgrading failing septic systems. Additional goals of the program were to develop a computerized database of septic systems in the town, to identify and prioritize areas in town which need to be protected from pollution, and to develop an ongoing septic system education and monitoring program.

Community residents in environmentally sensitive areas with failed septic systems were offered long-term low interest loans through the State Water Pollution Abatement Trust and DEP to upgrade their systems. GIS was used to determine program eligibility. Residents with failed septic systems who expressed interest in the loan program were ranked based on whether their system was located in an environmentally sensitive area. Those whose systems were located in the most sensitive areas were ranked highest and were guaranteed access to loan funds.

People

The health director was responsible for setting up the project and becoming trained in GIS. The director spent 50 hours in the first 6 months on the project, half on project oversight and half on training and developing the GIS system.

Two student interns were assigned to sort through records at the Board of Health, Conservation Commission, and the Department of Public Works, to compare septic system records with water billing records and to develop a computerized data base of septic systems. The interns spent approximately 100 hours reviewing records and formatting and entering data into an Excel spreadsheet. Approximately 5 hours were spent by the health director and the interns reviewing the structure and limitations of the databases in the other departments.

Interagency Cooperation

Environmentally Sensitive Areas were identified by consulting with the Conservation Commission, the Department of Public Works and the Boards of Health in Needham and contiguous communities. Discussion of short term and long-term pollution concerns provided an ideal opportunity for improved interagency cooperation. Concern was initially expressed by the Department of Public Works that the project would interfere with its GIS development plans. The Department of Public Works' concerns were alleviated after meeting with the health department to discuss program goals, introduce the interns to department staff, and develop plans to share all program data. Interagency cooperation was essential to the success of the program as interns needed complete access to files in the departments.

Data

Septic system data were collected from board of health files and cross-referenced with Department of Public Works, Conservation Commission, and data processing-billing records, to develop an updated master list of septic systems. Many of the records in the Board of Health files from 1950 to 1970 were no longer valid because at the time sewer connection records were not consistently shared with the Board of Health. Approximately 800 of the 10,000 homes in Needham use on-site sewage treatment and disposal systems, the remainder are connected to the municipal sewer system. In addition to system location, information was also collected on system type, pumping history, date of upgrade, and date of last inspection.

Software

The GIS software application used was MapInfo Professional 4.1. Software costs, including 1995 Norfolk County Tiger census files, were $1,200. Other software used for the project, such as Microsoft Excel, was already in use by the Board of Health. The software was considered not intuitive for the first time user because MapInfo Professional 4.1 menus and manuals use specific, technical GIS terms, and the look and feel of the desktop is different from other Windows programs. In addition to software costs, the health director was trained in basic use of MapInfo Professional for $700.

Hardware

A stand alone 200 MHZ computer, with a 12x CD rom, color printer and scanner was purchased. The cost was approximately $3,500. The system was considered sufficient in speed and memory to operate the GIS program.

Analysis

MapInfo software was used to graphically identify wellhead protection Zones II and III, and to calculate a 500 foot buffer around the Charles River which borders much of the town. Working directly from Excel database files, the location of homes using septic systems were automatically plotted on the map. The GIS software was also used to identify, list, and prioritize environmental risk of failed septic systems depending on which environmentally sensitive area the system was located in.

Methodology

Working from detailed maps of well head protection areas, prepared by consultants to the Department of Public Works, MapInfo software was used to draw polygons representing the water supply protection zones II and III for the Towns of Needham and Wellesley. A 500 foot buffer was drawn around the Charles River which makes up the border for two-thirds of the town. The location of the 800 septic systems were identified and plotted on the map using the GIS software.

Presentation

Separate maps were made of the location of the high risk environmental areas and the septic systems. The Board of Health, in consultation with DEP, the Department of Public Works, and Board of Selectmen used this information to prioritize loan program eligibility. A report was then mailed to DEP and the Board of Selectmen outlining the program's goals, loan program eligibility, and the proposed selection process.

DEP approval was required before proceeding with loans to residents. Residents were notified of the program by direct mailings, which included maps showing location of high risk environmental zones, and through public meetings in which the maps were presented and discussed.

Implementation

Because loan funds from DEP and the Water Pollution Abatement Trust were limited, results of the analysis were used by the Board of Health to determine program eligibility and to develop a priority list for allocation of loan funds. Mailing labels were developed and educational information was mailed to all septic system owners educating them on proper septic system maintenance and notifying them about the loan program. Costs were $260 for mailing and $800 for printing of materials.

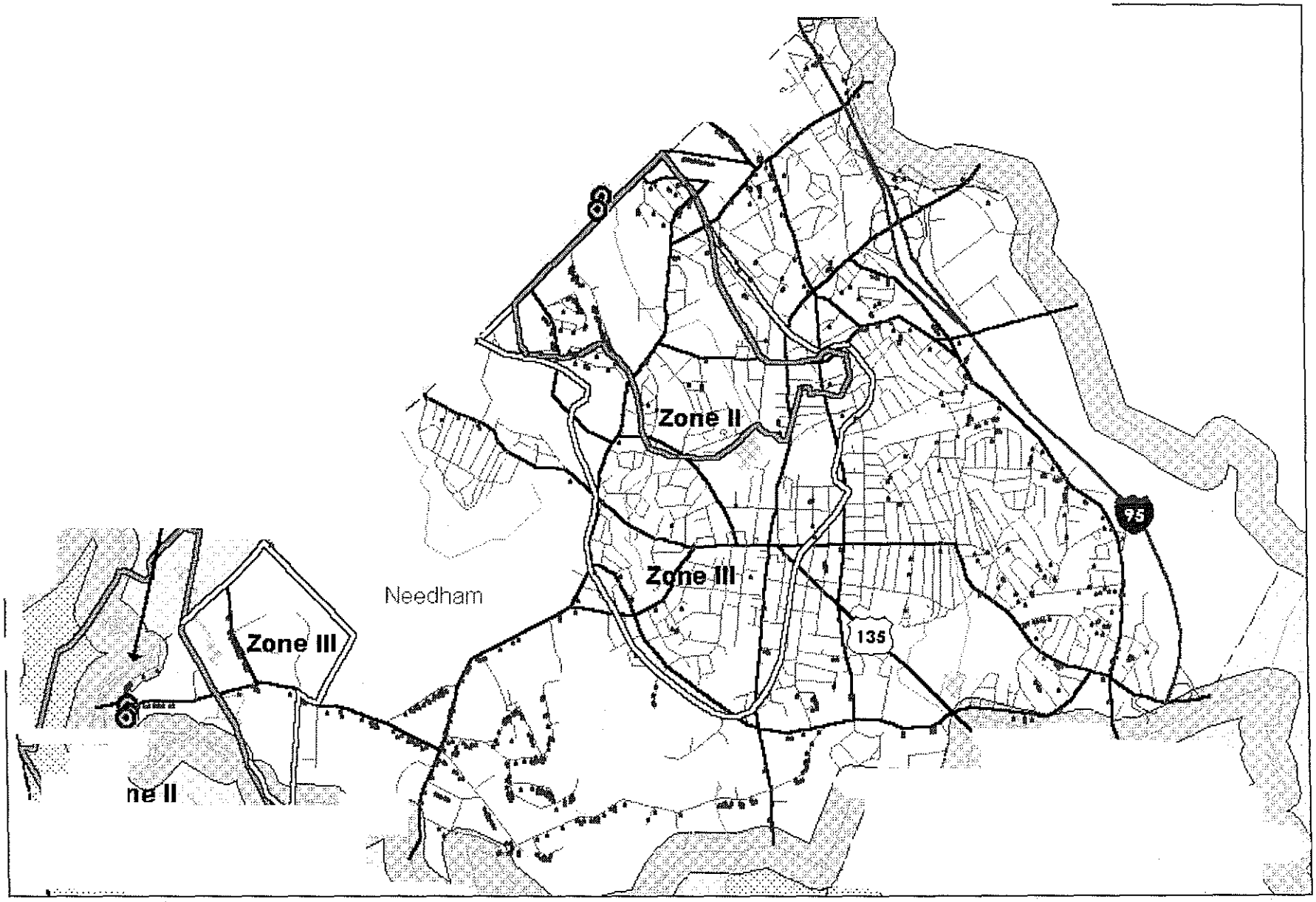
Residents were notified that they would be eligible for the program if their system showed signs of failure and if they lived in one of the high risk areas. A map of the high risk areas with their priority ranking was enclosed. The geographic location of homeowners who expressed interest in participating in the loan program was plotted on the map using the GIS software. Those located within the highest risk environmental areas were given more information about the program, told how to have their systems inspected, and encouraged to apply for the low interest loans to upgrade septic systems if it was failing.

Results

Thirty residents expressed an interest in applying for the loans. Because the community had limited loan funds ten residents located in highest risk areas were asked to participate in the first round of the program. Five of the ten selected chose not to participate because their septic systems passed inspection. Other residents, lower on the priority list, are now being offered a chance to participate in the program. The geographical component to this program greatly simplified the identification and prioritization of residents interested in participating. The clear, visual criteria developed for participation reduced the chance that residents would argue about their eligibility.

Through direct mailings and public meetings, the program has been very successful in educating residents about septic systems and their need for maintenance, and in increasing awareness about the location of environmentally

Needham (MA) Wellhead and Source Water Protection Zones



sensitive areas of town. Town officials now know the number of septic systems in the town and are familiar with the environmental impact and public health hazards of failing septic systems. The information is also being used by Department of Public Works' consultants who are developing the town's sewer master plan, including identifying priority areas for expansion of the sewer system. Information on environmentally sensitive areas will also be used to prioritize proposed expansion of the sewer system.

Future Plans

Using information on system failures and the frequency of pumping of septic tanks, the GIS system will flag the location of systems at risk of failure and areas of town where failures have been previously reported. Those residents at risk for system failure and in environmentally sensitive areas will be targeted for an education program and subsequently for an enforcement campaign. The GIS system is also being used to map locations of other pollution risks and health concerns such as underground storage tanks and hazardous waste sites. All information is being shared with the Department of Public Works, planning, police and fire departments.

Lessons Learned

Staff involved in the GIS program at the Needham Board of Health strongly recommend training in GIS, such as introductory courses offered by GIS software vendors, before attempting a similar program.

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Perception vs. Reality: GIS in Environmental Justice Through Pollution Prevention

By Marion Kinkade, M.C.R.P. (Candidate)

Description of Jurisdiction

Lancaster County (NE) is approximately 233,319, with the City of Lincoln comprising approximately 209,000. The urban center is Lincoln, but the majority of the land area of Lancaster County is rural. Lincoln-Lancaster County Health Department (LLCHD) has about 230 staff members with an annual budget, including city/county and grant funds, of approximately $9 million. LLCHD has one full-time GIS Coordinator and three part-time users. The Pollution Prevention (P2) program is made up of four full-time people. Other staff members have been trained in P2 and incorporate its principals in their work. The budget for P2 program exceeds $250,000, not including the Environmental Justice through Pollution Prevention (EJ/P2) grant of $129,567.

Program History

The P2 program was established in 1993 and LLCHD began using GIS in 1996. This involved a graduate student intern who was hired to create a GIS groundwater database. The U.S. Environmental Protection Agency EJ/P2 grant established the purpose and funds for the current EJ/P2 program incorporating a GIS.

GIS has been used in the EJ/P2 effort at LLCHD to map the census tracts with the highest percent of minority population in Lincoln and the highest percent of the people who live in poverty. Also, the location of Tier II sites (businesses that store hazardous chemicals), Title V sites (businesses that emit air pollutants), special waste sites (businesses that require permits to dispose of non-hazardous "special" waste), community facilities, sensitive populations, and responses to the Environmental Health Hazard Risks in the Minority Community Survey are mapped using GIS. By overlaying

these data, LLCHD acquired the capability to assess the needs of the community and the businesses in the identified census tracts.

Project Goals

The goals of the EJ/P2 project were to: identify the perceptions, knowledge and beliefs of the minority populations and assess risks posed by environmental hazards; provide pollution prevention technical assistance to the business community to reduce those risks; and provide funds directly to the minority community groups to provide education within established cultural frameworks. Two approaches or case studies were used by the LLCHD to determine which was the more effective intervention strategy; the strong agency approach or the strong person approach.

The Problem

The use of GIS in the EJ/P2 project has allowed LLCHD to analyze and compare existing data to new information gained from responses to the Minority Community Survey. The specific task of GIS in our EJ/P2 project was to compare responses from the survey with known potential environmental hazards, such as Tier II sites and their evacuation zones. The evacuation zones are based on the type and amount of chemicals stored in each facility. With this knowledge, LLCHD identified potentially hazardous locations and compared "real" risk to minority community knowledge and perception of environmental hazards in their neighborhood. The ability to overlay diverse environmental data and community perceptions has allowed LLCHD to view the community in a way that would have otherwise been very difficult or impossible to do.

People

The EJ/P2 project involved people from within and outside the health department. Within the Department, the LLCHD has created two interdisciplinary teams: one focused on EJ/P2 and other on the other on GIS. These teams include the chief and assistant chiefs, environmental engineers, environmental health specialist, and health educators from the Environmental Health Division, the department's epidemiologist, information services staff, public health nurses, Healthy Homes Minority Outreach Specialists, and the finance manager.

Interagency Cooperation

Program success required interagency involvement. In addition to working with other government agencies, LLCHD worked with several community organizations. The Asian Center, the Malone Center (serving the African American community), the Hispanic Center, and the Indian Center provided guidance, input, meeting rooms, and volunteers for various phases of the project. The Lincoln Water System provided educational tours for members of the Asian community and participated in meetings at the Asian Cultural Center. The Planning Department provided data from the GIS server. The Nebraska Department of Environmental Quality and the Nebraska Game and Parks Commission provided information for the fish advisories for the Asian community. Professor Rodrigo Cantarero from the University of Nebraska organized, conducted, and analyzed the survey.

Data

LLCHD started by compiling demographic data to define the areas of the community to survey and gathering all data that would characterize the community. It then built databases from Tier II, special waste, and Title V air emission data. LLCHD used data from the Planning Department that consisted of streets, aerial photos, the water system, and housing information. It also mapped the location of the responses to the minority community survey to the census block level. Community facilities, including schools, nursing homes, parks, camp grounds, child card providers, community centers, and libraries, were also mapped.

Obstacles encountered included the lack of computerized data, which included addresses for community facilities so they could be mapped. These were entered manually. In addition, some of the databases were incomplete, with information missing or addresses in the wrong format to geocode for use in GIS.

When the LLCHD first started using existing health department data for GIS analysis, it was discovered that the format the data was stored in would need to be changed. LLCHD's GIS steering committee determined a standard format for all future databases so that the format could be utilized by anyone and compiled data easily imported into the GIS application.

Software

The software that was used for this project was ArcView GIS with the Spatial Analyst, X-tools, Projector!ol, and Buffer extensions. ArcView ranges between $820 and $1,195, varying from state to state, as does Spatial Analyst, which ranges between $2,246 and $2,495. But both the X-tools extension and Projector!ol extension are free downloads from the Oregon Department of Forestry's website (http://www.odf.state.or.us/default.htm).

Hardware

A Compaq Professional Workstation 5100, including a Pentium II 300 MHz computer, with a 21 inch monitor was used for the project. The system costs approximately $6,000. This workstation has Windows NT and 64 MB of RAM (NT is the preferable operating system, but 128 MB of RAM would have been better). Data was stored on the LLCHD's server network.

Analysis

LLCHD used the McHargian Analysis process for this project, which is a technique of layering spatial data to analyze a site for land use planning. The same process can be used to find patterns in the community for epidemiological outbreaks, as well as pollution prevention opportunities.

Presentation

The results have been presented to the Asian community at an open house at the Malone Center and to the entire staff of the health department. A presentation to the City Council is also planned.

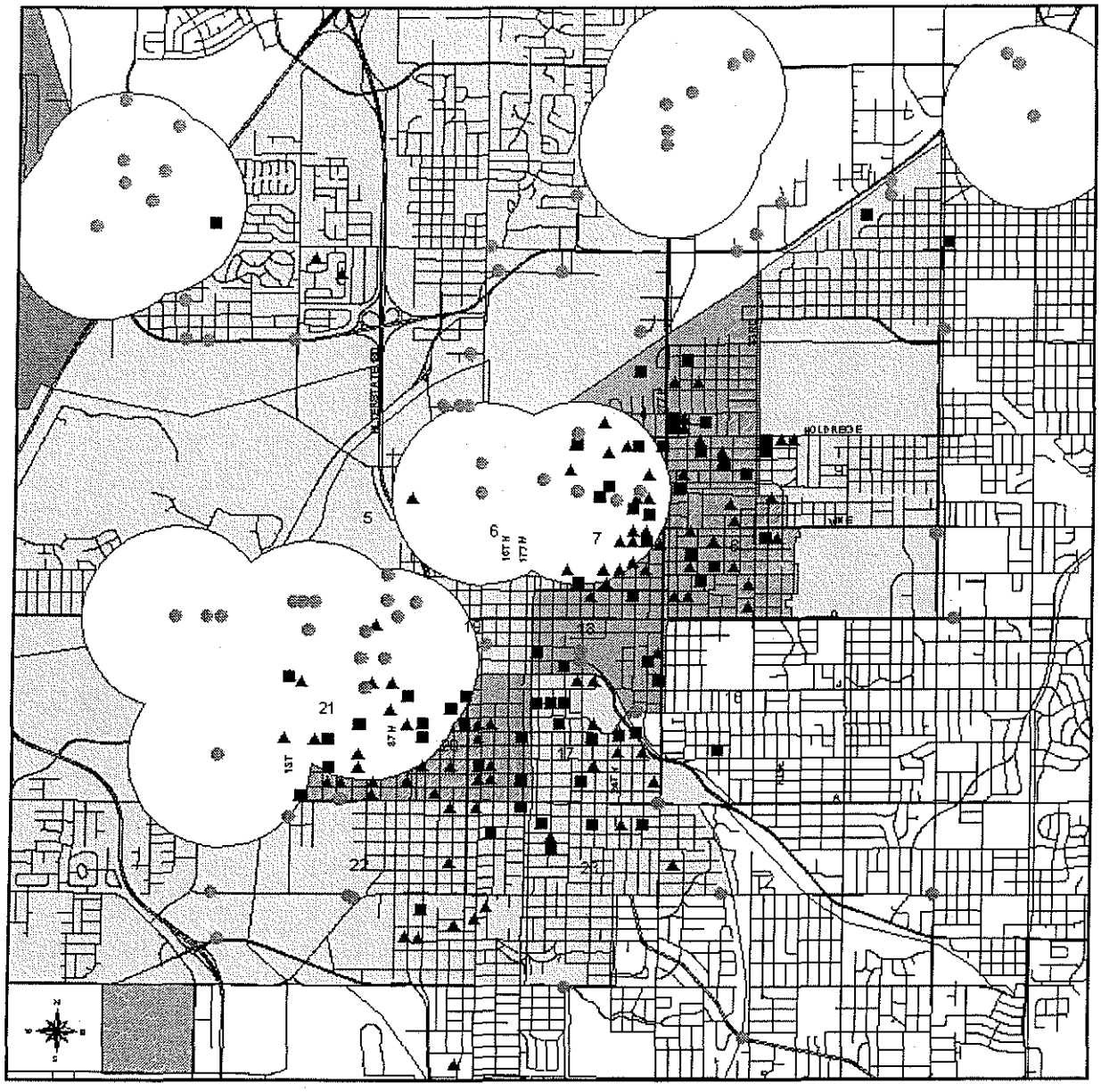
LLCHD is using GIS to guide in-house decisions, such as locating the mobile health clinic, identifying areas of the community for AmeriCorps Volunteer programs and the Lead Program, and assisting the Planning Department in its decision-making process. The LLCHD will be taking this process to the next level by using it to help the mayor and city council in their decision-making processes

Implementation

When final analysis is complete, the information can be used to guide the efforts of LLCHD's Healthy Homes Program and the Pollution Prevention Technical Assistance Program. Healthy Homes Program staff are minority community outreach specialists who focus on healthy outcomes for pregnancy, improving access to and use of preventive health services and health education. Healthy Homes Program staff are frequently in homes and can evaluate environmental health hazards. Training on environmental health risks has been provided to the outreach specialists. The specialists recommend changes in the home, such as locking up all poisons, cleaners, and pesticides, and encourage the use of non-mercury thermometers. Engineering staff of the Pollution Prevention Technical Assistance Program visit businesses in the community to evaluate chemical use and practices discuss P2 strategies that can save money, reduce health risks, prevent pollution, and make businesses and the neighborhood a safer place.

Results

LLCHD has exceeded the goals identified in the EJ/P2 grant. The Minority Community Survey resulted in identification of concerns consisting of hazardous chemicals in homes to garbage in neighborhoods. Through the use of GIS and databases information about businesses in neighborhoods, LLCHD was able to identify potential risks to the residents from chemicals stored in the businesses. LLCHD has found that the same process and data can be used for emergency response and land use planning. Without the use of GIS, it would have been difficult to determine specific areas upon which to focus pollution prevention and education efforts in the minority community. It would have also been difficult to assess the results of those efforts. Due to the data sources LLCHD



Responses to the Survey* in Relation to the Primary Minority Census Tracts and the Evacuation Zones for Tier II Sites** Lincoln, Nebraska

- Tier II Sites with 1/2 mile evacuation zones
- Concerns in the neighborhood *
  - Hazardous Chemicals is a concern
  - Hazardous Chemicals is not a concern
- Streets

Census Tracts by Percent of Non-White Population
- 0.64 - 4.32
- 4.32 - 10.78
- 10.78 - 25.68

LINCOLN-LANCASTER COUNTY HEALTH DEPARTMENT

Carl Kinkade
8/10/98

* Environmental Health Hazard Risks in the Minority Community Survey

** Tier II sites are businesses that house hazardous chemicals above a certain amount, dependent on the chemical type, requiring a permit.

assembled for the EJ/P2 grant, LLCHD has the capability to use the same information to guide the efforts of the Mobile Health Clinic and the Lead Program.

Future Steps

The LLCHD's goal is to secure solid funding for a full-time, permanent GIS Coordinator. The GIS program will continue to work with members of the minority community and businesses on issues concerning environmental awareness and pollution prevention. LLCHD will continue to use GIS in other programs, such as the Lead Program, locating the Mobile Health Clinic, Epidemiology, groundwater, and more case-specific work like chemical spills and outbreaks. It will also continue to develop its databases and GIS capabilities.

Lessons Learned

One of the most important issues in setting up a GIS system is that, initially, many staff hours must be dedicated to creating databases and structure. Thus, tangible results are slow to come. LLCHD has been fortunate to develop good working relationships with the City Planning Department, County Assessor's Office, the Nebraska Department of Environmental Quality, Nebraska Resource Commission, Nebraska Game and Parks Commission, and the County Extension Office.

LLCHD strongly recommends that other health departments establish GIS capabilities, build good relations with other GIS users in the community, and receive quality training. It also recommends that EJ/P2 programs set up minority advisory committees and use the members' knowledge to the fullest. If LLCHD had to do the EJ/P2 grant all over, the scope of work with the minority community would have been narrowed to allow more focus on specific needs.

"LLCHD strongly recommends that other health departments establish GIS capabilities, build good relations with other GIS users in the community, and receive quality training."

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Reno County Wellhead Protection Program

By Daniel L. Partridge, R.S., B.S.

Description of Jurisdiction

Reno County (KS) has a population of 60,000 people, 40,000 of whom live in Hutchinson, the principal city of the county. The county is 1,256 square miles in size and, with the exception of Hutchinson, is a rural agricultural community. The wellhead protection program described in this case study focuses on the protection of Hutchinson's water supply, which is located within the city itself, as well as the suburban and rural areas northwest of Hutchinson. This water system is owned and operated by the City of Hutchinson which is working in cooperation with the Health Department on a voluntary basis to establish a wellhead protection plan. The Reno County Health Department employs the full-time equivalent of approximately 50 people and has an annual operating budget of $1.3 million. The Health Department has funded the wellhead protection program with Local Environmental Protection Grants from the Kansas Water Authority and in-kind services from a variety of local agencies. These are one-year grants and the program is currently awaiting approval for a third grant year. Grant awards have been: $24,500 for the first year, $14,500 for the second, and $14,600 has been requested for the third year.

Program History

The program is guided by a steering committee appointed by the Board of County Commissioners. In turn, the steering committee formed an advisory board whose function is to provide public input into each stage of the programs' development. The work completed to date has been primarily accomplished through county staff time at the health department, with assistance from the Reno County Geographic Information Systems (GIS) Coordinator. Volunteers from the Retired Senior Volunteer Program and the Community College were trained and used to conduct the door-to-door inventories used in this program to evaluate the severity of potential risks to Hutchinson's water supply. The only additional paid staff for this program has been a temporary coordinator, hired for six months, whose responsibility was the supervision of the volunteer surveyors.

The health department began using GIS software applications in 1992 when State funds were made available to county environmental health departments across the state. Currently, the health department has only one employee who is able to use GIS software effectively. Due to budget constraints it is unlikely that more staff will be added in the near future. For Reno County, the ability to tap the potential of GIS did not begin until 1994 when the Appraisal Department and Conservation District began using GIS and a GIS committee was formed.

Program Goals

The first task facing the wellhead protection steering committee was to determine the source of the public water supply. The next task was to describe the risks to water quality within the area providing Hutchinson its drinking water. With the exception of chlorination, groundwater is not treated prior to use. This means that, the quality of the groundwater is directly related to the quality of the drinking water. Program goals are to: identify the surface area which has the greatest impact on groundwater quality; identify the threats within that area; develop and implement a strategy to reduce the impact of current activities through pollution prevention; and develop and encourage groundwater-friendly growth and development in this wellhead protection zone.

The Problem

Hutchinson's water system is dependent entirely upon groundwater as its source of drinking water. Three of the 20 municipal wells are not currently used, due to the presence of volatile organic compounds. A fourth well is not used because of its high mineral content giving it an unpleasant taste. The city has invested a great deal of resources into the development of a series of wells outside the city limits. This area currently has a high quality of water. If quality concerns arise in this second wellfield, the alternative would be the construction of a costly water treatment plant and the restructuring of the water distribution system.

People/Interagency Cooperation

Steering committee members were appointed by the Reno County Board of Commissioners. Committee membership represents the core group of agencies and citizen groups with interests in groundwater protection, and is responsible for the development of the wellhead protection management plan. Project steering committee members included: the City of Hutchinson Utilities Director and Assistant to the Hutchinson Public Works Director, who assisted with coordinating public meetings, training of volunteer staff, and provided technical information about the water system; the Equus Beds Groundwater Management District Manager, who was the hydrologist who provided the zones of capture for the public water supply wells using a computer modeling program to simulate groundwater withdrawal; the Reno County Health Department Environmental Health Supervisor, who assisted in coordinating public meetings, training of volunteer staff, conversion of zones of capture into a GIS format, and development of planning and public information maps and program reports, and; the GIS Coordinator for the Reno County Appraisal Department, who developed the property parcel layer used to spatially link the inventory of potential pollutants within the wellhead protection area, and assisted in converting the zone of capture computer drawings into a GIS format.

Without the cooperative effort of the county GIS steering committee, progress would have been much slower and more costly.

A larger advisory board was formed by the steering committee to provide broader input. Advisory board membership has been open to any interested citizen, with an emphasis placed on recruiting state environmental agencies, businesses, educators, farmers, and large scale agricultural and industrial water users as members. The advisory board meets periodically to receive program updates and offer direction to the steering committee. The steering committee is chaired by a local realtor with the health department providing administrative support.

Data

In 1997 a GIS fiber optic network was installed to connect the Health, Public Works, Planning, Zoning, Utilities, Emergency Management, and Appraisal Departments of the county into one shared database. All of these departments share the maintenance and development costs. With the ability to communicate effectively between departments and databases the GIS portion of this program was more easily implemented

The decision about which data to use and how it was then tied together spatially was based on the need to spend as little time creating new data files as possible. Most of the information was already complete before the program began, but resided in different departments' systems. Two of the data sets specifically created for this program were zones of capture, which identify the wellhead protection zone, and potential pollutant inventory, which was a digital database created from a door-to-door survey. Respondents were asked for information on equipment and practices associated with the potential for groundwater contamination. The greatest amount of GIS work was spent converting the zones of capture data. After these files were given points that could be geographically defined, (i.e., latitude/longitude), the computer was able to describe all the points and arcs in the file using a geographic projection. After conversion, hundreds of arcs that were not relevant and increased the cluttered look of the map were deleted from the file.

Software

- Arc/View version 3.0a and Data Automation Kit version 3.5.1. Bundled cost = $1,695.
- Arc/Info, including three user license shared among departments. Cost = $11,200.

Additional software needed included:

- Intergraph DiscAccess and KEA Attachmate, network communications programs needed to link personal computers with a Unix mainframe computer. Combined cost = $535.
- Microsoft Access, a database program used to store and link inventory data to GIS through the parcels database. Cost = $310 (can also be purchased as part of a Microsoft Office software package).

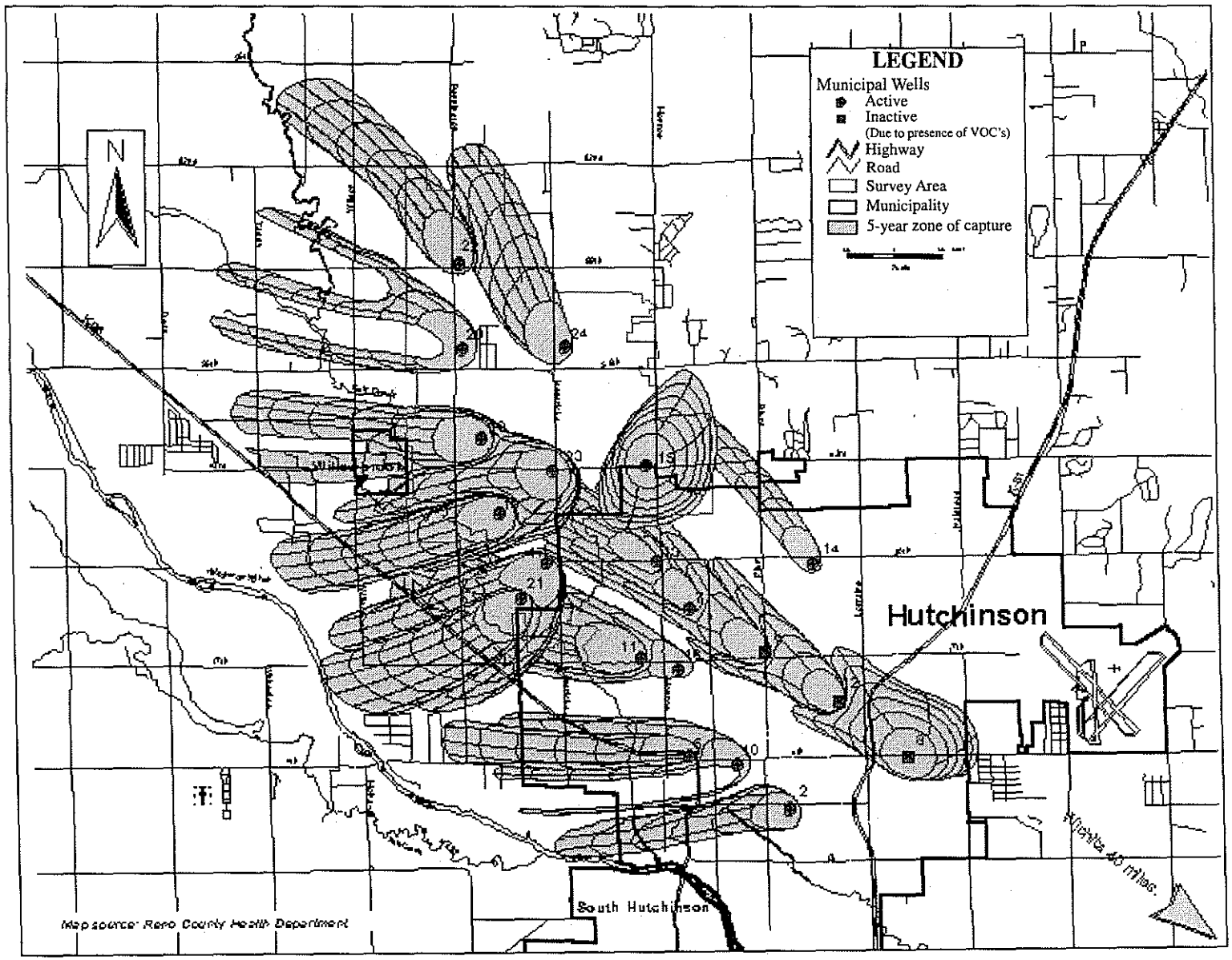
Hardware

- Personal Computer Compaq Deskpro EP with 4.3 gigabytes hard drive, 98 megabytes of RAM, 300 MHz, and 19 inch monitor. Cost = $ 2,346.
- Fiber Optic Network (health department share). Cost = $3,137.
- Sun mainframe computer used to store data and run Arc/Info. Cost = $25,000 (paid from county general fund, with no direct cost to the health department).

Analysis

Once the data was collected and developed, maps were generated for each pollutant inventoried that spatially displayed their distribution through the wellhead protection zone. Fertilizer and pesticide usage was tracked as number of applications per year. In an effort to keep the survey process as non-threatening as possible and hopefully maintain public support for the program, no attempt was made to determine if these chemicals were over applied. Maps, showing the distribution of each potential pollutant, were produced by querying the inventory database and selecting the associated parcels. Of the approximately 800 parcels in the area surveyed, the response rate for participating in the pollutant inventory was 85 percent. Information on the remaining parcels was not

Public Water Supply Wellhead Protection Zones for Hutchinson, KS



Feature data provided by: Reno County Health Department, Reno County Appraiser's Office, U.S. Census Bureau, and the Equus Beds Groundwater Management District. Funding provided by the Kansas Water Authority and the Kansas Department of Health and Environment.

surveyed for potential groundwater contaminants.

obtained due either to property owner resistance or inability to contact the owner.

Presentation

Maps of the zones of capture and pollutant inventory results were produced for each steering committee member. Poster displays were shown to advisory board members. A final report, including maps, was given to the city and county commissions outlining recommended management practices. A map showing the location of the survey area, known groundwater contamination areas and public water supply wells was invaluable at the initial public meeting held prior to the inventory process. Area residents are aware of the vulnerability of their groundwater and resistance to this program to date has been less than expected.

"GIS is only a tool. Its value is determined not by its potential, but by the results of the labor you invested in it."

Implementation

The results of these efforts, so far, have shown that the major current and future threats to the northwest well field are agricultural and suburban lawn and garden fertilizer usage, and the dependence of homeowners on private septic systems. Best management practices (BMPs) for both of these issues have been developed by the steering committee and partially implemented by the health department and conservation district. The focus now is to increase the number of landowners implementing these BMPs. This can be accomplished through: increased local funding of voluntary cost share programs, which reimburse property owners for a portion of the costs of implementing BMP's; raising awareness of the problem through education, and; amending local codes to raise mandatory minimum standards of construction and operation to reduce bacterial and nitrate contamination from septic systems.

Results

The initial goal of developing a wellhead protection plan for the city of Hutchinson, which is already being used as a model for other towns in the county, has been met. As other Reno County communities have begun similar efforts, Hutchinson's draft plan of action is awaiting public comment through a series of public meetings. After receiving public comment, the steering committee will forward the management plan to the governing bodies of Reno County and Hutchinson. Education of the public regarding groundwater quantity and quality issues was recognized early on as a key element to the program's success. Toward that goal, a partnership with the Hutchinson School District to provide groundwater pollution prevention education at the elementary and middle school levels began with the 1997-98 school year. This program is not just for Hutchinson, but is serving as a model for the 13 other towns and rural water districts of Reno County. What began as a program to protect Hutchinson's water supply has evolved into a true public health bargain which allows public water suppliers to meet upcoming U.S. Environmental Protection Agency deadlines to meet Safe Drinking Water Act regulations on source water protection.

Future Steps

The data developed for this program will continue to be used as a means to identify target audiences for future pollution prevention education and implementation campaigns. The health department currently makes pollution prevention referrals to the Kansas Small Business Environmental Assistance Program on a case-by-case basis. These public awareness campaigns are tools to inform businesses on the availability of state and academic resources aimed at promoting cost effective and environmentally-friendly alternatives to current commercial practices. In Reno County, five other towns have joined the steering committee and are developing similar programs. Contracts have been signed with the multi-county Equus Beds Groundwater Management District to produce zones of capture for these communities and some inventory work has been completed. Four other public water suppliers in Reno County are awaiting grant funding before joining the steering committee and beginning their own programs.

Lessons Learned

While this program has gone well, there is always room for improvement. Time restrictions, due to grant requirements, dictated that the inventory be completed prior to receiving the GIS analysis of the groundwater zones of capture from the GIS consultant (this would have better defined our survey area). As a result, the inventory is not as complete as it could have been. GIS is only a tool. Its value is determined not by its potential but by the results of the labor you invested in it. Without dedicated, trained staff, GIS can end up being like that expensive piece of exercise equipment stored in your basement or garage. Given the size of Reno County, a full-time GIS person for the health department is not possible. However, collaboration and cooperation among several county departments has enabled each department to accomplish more than was individually possible.

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NACCHO Information

The National Association of County and City Health Officials (NACCHO) is the national voice of local health officials and is dedicated to improving and protecting the public's health by increasing the capacity of local health departments (LHDs) to fulfill the core functions of public health: assessment, policy development, and assurance. NACCHO serves all of the 2,932 LHDs nationwide; this includes county, city, and district health departments. NACCHO's work focuses on providing education, training and technical assistance aimed at assuring the public's health. GIS is one tool that is used in fulfilling this role. In addition, NACCHO serves as a communication vehicle among local, state, and federal public health and environmental health agencies, allowing NACCHO to promote pollution prevention and share successes.

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