

Leveraging Local Health Departments to Provide GPS Coordinates on Well Testing Forms

2010 - 2011

Environmental Public Health Leadership Institute Fellow:

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EXECUTIVE SUMMARY:

The use of geolocation data to track environmental contaminants and their potential for exposure to communities is essential in preventing and controlling adverse health outcomes. In accordance to North Carolina Administrative Code, 15A.NCAC.18A.3800, all new wells are to be tested for inorganic chemicals and microbial contaminants prior to use as a drinking water source. When contaminant(s) are present, information about each contaminant, recommendations for use, and recommendations for re-sampling are made by the Occupational and Environmental Epidemiology Branch to the county local health department (LHD) where the well water sample was obtained. Although space on the request form is available for entering geographic positioning system (GPS) coordinates, over 80% of the well sample analysis requests do not include these data. To produce state-level contaminant maps for the LHDs by the state is a costly and time-consuming process whereby sophisticated statistical geocoding methods must be used. However, the resolution of these contaminant maps is lacking. To provide community-level resolution of well contaminants, GPS coordinates are needed. Shifting the Burden archetype is evident here thereby the state has taken on the burden of geocoding less accurate location data. A quick fix is to require the LHDs to enter GPS coordinates on the test request forms (LHDs function autonomously). A long-term solution is to gain buy-in from the LHDs through awareness activities. To understand the root causes of this problem, stakeholders will be surveyed to understand GPS equipment availability, GPS training, and location data acquisition and storage. As a leverage, the survey results along with examples of completed maps will be presented to the LHDs at the next Environmental Health Liaison meeting. Another leverage is to remind the LHDs when the volatile organic compound rule is executed in 2012, their decision to test wells for these contaminants will be greatly simplified if they can rule out contaminated wells in the vicinity of the tested well. GPS coordinates will provide the necessary high-resolution contaminant maps to assist the LHDs in this decision-making process and save them, as well as the well owner, money.

INTRODUCTION/BACKGROUND:

Every new private well in North Carolina is required to be tested for biological and inorganic contaminants prior to issuing the permit. In 2012, new well testing will also include volatile organic compounds. Well owners can have their wells tested through the Local Health Departments (LHDs). The LHDs provide sampling kits for new wells test sampling. When a sample is collected, basic well information is recorded on the State Laboratory of Public Health Well Test Request form. The information includes property owner contact information, sample collection date and time, laboratory receipt date and time, local health department contact information, and permit information are recorded on the laboratory analysis request form. The form and sample are transported to the laboratory for analysis. Once the sample has been received by the laboratory, the information provided on the form is entered into the laboratory data system. The sample is analyzed for the contaminants listed above and a report is created of the results.

The results are entered into the laboratory data system. A copy of the results are sent to the sample's local health department and to the Occupational and Environmental Epidemiology Branch for data analysis. The data analysis includes recommendations for use, information about each contaminant, and recommendations for further testing. These data analyses are sent to the local health department where the wells are located. The local health department contacts the well owner and provides them with the recommendations and the results of the well water sample testing.

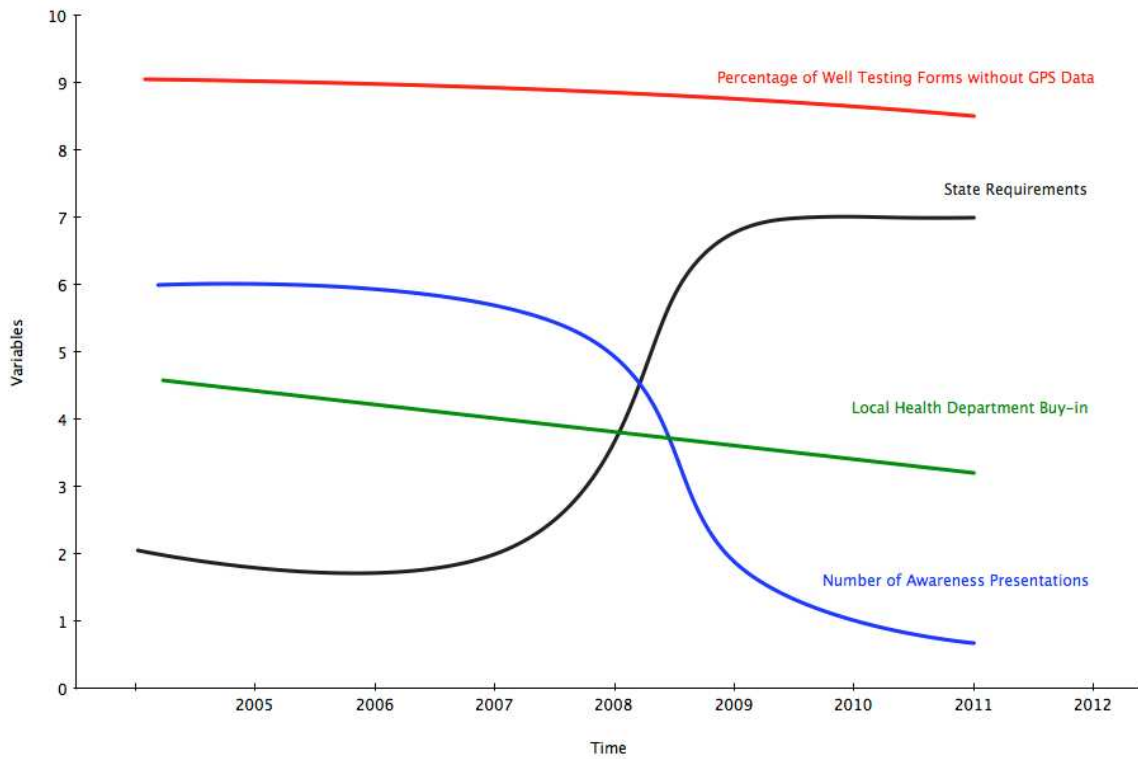
There are three places where well location information is entered into a database: State Laboratory of Public Health, the local health departments, and the Division of Environmental Health (permits). At this time there are no unique identifiers that can link all three databases. Missing from the laboratory database are consistent geographic positioning system (GPS) locations of each well. Approximately 20% of the new well forms submitted by local health departments have recorded GPS coordinates.

By providing GPS location data, maps of well water contaminants can be created with greater accuracy and resolution. This will become especially important when the volatile organic compound (VOC) rule is implemented. LHDs are to screen for existing hazards prior to recommending whether or not new wells should be tested for VOCs. Moreover, GPS data can be used to link to other databases such as inactive waste, national priority listing (NPL), and other sites to provide a more thorough screening of existing hazards located near the new well. Effective screening will save the LHDs, as well as the well owner, money. Maps about inorganic contaminants will be published on the state web site for use by the general public along with educational materials about safe wells.

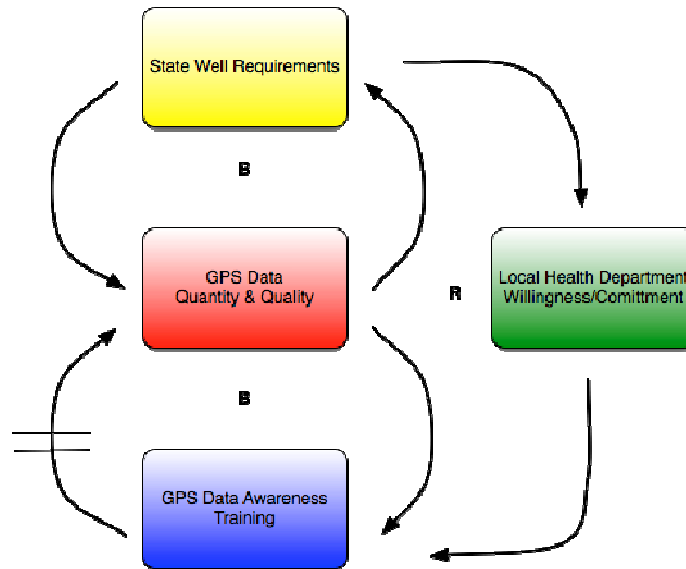
Problem Statement:

What is preventing Local Health Departments in North Carolina of including geographic positioning system (GPS) data on the new private well water testing request forms?

Behavior Over Time Graph:



Causal Loop Diagrams and applicable Archetypes:



10 Essential Environmental Health Services:

The demand for GPS linked well data has increased substantially during the past two years. This increase in demand has been due mainly to the implementation of state requirements for new well testing. Environmental, and environmental health and public health agencies, as well as academia have been requesting information about well contaminants for a variety of reasons.

For governmental agencies, GPS data can help to map where contaminants and hazards have occurred and by how much (i.e. concentration). Knowing where hazards exist can facilitate the development of targeted community health messages to reduce or prevent exposure to well water contaminants. For academia, GPS data can help to test hypotheses about well contaminants, health outcomes, and intervention efficacy. Therefore, the essential service this project seeks to enhance is the ability to “diagnose and investigate environmental health problems and health hazards in the community.”

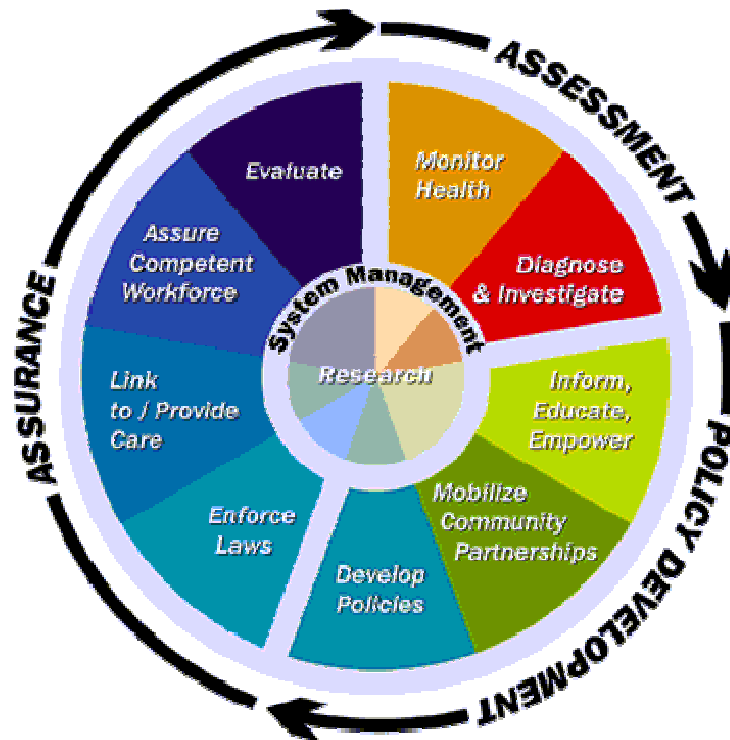


Figure 1: Ten Essential Environmental Health Services

National Goals Supported

This project supports the Healthy People 2010 objective of ground water quality. However, in the Healthy People 2020 objectives, only safe drinking water from community water supplies are mentioned. Although data to measure improvement are more robust with community and public water supplies, a substantial portion of population of North Carolina obtains their drinking water from private drinking water wells. This project will help to rectify the lack of data needed to track and measure outcomes associated with private well water quality.

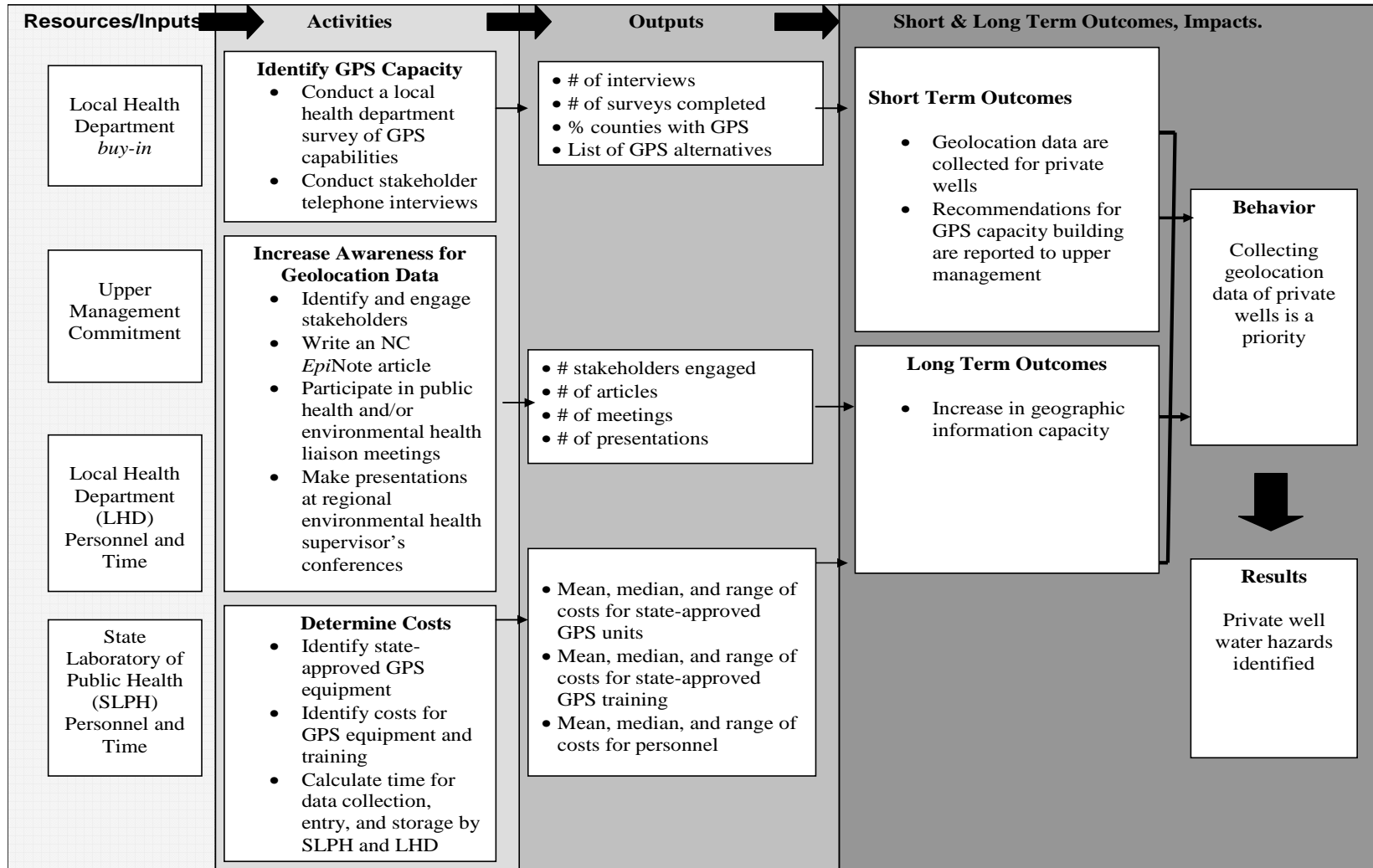
This project also supports the several of the goals of the National Strategy to Revitalize Environmental Public Health Services. This project utilizes the input from local and state leadership (foster leadership), assesses needs (build capacity), and future information sharing between various agencies, as well as with the public (communicate and market).

The American Public Health Association non-technical competency for local environmental health that this project supports is partnering. The development of a dialogue between various stakeholders is necessary to garner willingness and commitment of each to a common goal.

Project Logic Model:

Logic Model

Goal: Reduce or prevent exposure to environmental contaminants in private wells



PROJECT OBJECTIVES/DESCRIPTION/DELIVERABLES:

Program Goal

To reduce or prevent exposure to environmental contaminants in private drinking water wells.

Health Problem

No systematic or efficient identification of contaminants associated with new private wells in communities across the state.

Outcome Objective

Increase GPS data recording on new well testing forms to 80% by December 31, 2011.

Determinant

Only 20% of well forms have GPS coordinates recorded. When these data are recorded, various formats are used.

Impact Objective

All well test requests forms will contain standardized GPS coordinates of well location.

Contributing Factors

Staff time to record GPS coordinates on form; access and availability of equipment; and awareness training as to the need for the information.

Process Objectives

Develop partnerships; conduct interviews and surveys; develop recommendations; and develop and implement awareness training.

METHODOLOGY:

Events and Activities

June 2010 - conducted individual interviews with three local Environmental Health Directors;

November 2010 - prepared survey (10 questions);

January 2011 - example contaminant map completed;

January/February 2011 - meet with Environmental Liaison Committee and conduct survey;

March/April 2011 - report findings to the committee and solicit recommendations; and

May/August - develop and conduct awareness training.

RESULTS:

An observed 16 to 20% of the well test request forms for inorganic analysis by the State Laboratory of Public Health (SLPH) have GPS coordinates.

Interviews with several Environmental Health Directors across the state and who utilize the SLPH for their well testing, stated that staff time and lack of equipment and training may be the reasons why these data are not provided.

CONCLUSIONS:

A quick fix to this problem is to require GPS coordinates be recorded on all well test request forms. Willingness and commitment to provide these data will increase initially, but will eventually wane without sustainable pressure. A long-term solution is to develop buy-in from the local health departments through awareness training about why these data are important. The best way to get buy-in is to determine and use leverage.

The reasons why GPS data are important to include on well testing forms is that it can be used as a unique identifier for future linking with other datasets. Linking various datasets will help to create maps of well hazards in communities, regions, and across the state. Knowing where common contaminants occur will help to focus effective and appropriate public health messages. Furthermore, when the VOC rule is enacted, maps can be created to help the local health departments determine the need for such testing. Testing for VOCs is very expensive. Providing good screening maps will target testing for those areas where it is necessary.

Not all local health departments may not be able to provide GPS data. A survey to determine the gaps and needs of GPS equipment and training has been prepared. However, in order to demonstrate the outcome of providing GPS data by the local health departments, a concurrent mapping project of inorganic contaminants had to be completed prior to conducting the survey. A map of arsenic is the first contaminant map created to show where this contaminant occurs across the state. Because no GPS coordinates were uniformly available for mapping wells, a surrogate geocoding procedure had to be used. This geocoding approach represents hundreds of man-hours at a cost of tens of thousands of dollars. This map provides a only a one-time snapshot across the state where arsenic occurs, but lacks community-level resolution. GPS coordinates would provide better resolution and more approaches to mapping well contaminants.

The next step in the process is to meet with the state's Environmental Liaison Committee to discuss this project and conduct the survey. Using the arsenic map as a leverage will demonstrate the demand for GPS data and real outcomes that the local health departments can actually see and expect. If the survey is approved for distribution, results will be shared with the committee and recommendations solicited for awareness training of local health departments.

LEADERSHIP DEVELOPMENT OPPORTUNITIES:

Mina Shehee, PhD

First, I want to thank my mentor, my team members, the cohort VI fellows, the EPHLI staff, and CDC to learn, grow and share with you this past year. Learning the concepts and methods of systems thinking brought a new dimension of problem solving to our organization this year. I really had to stretch out my traditional lines of thought to incorporate systems thinking into my work. It really made me aware that quick fixes are really a waste of time and that to truly solve a problem requires effort beyond the obvious.

The Individual Development Program (IDP) complements systems thinking. Being aware of who you are, how to relate to your world, and how you respond to change allows you to think more systematically and effectively. Leaders are expected to tackle tough problems and achieve results. To do this, you must be able to muster the best from others. The IDP provided me with the necessary tools to be a more effective leader and the means to gain proficiency with them. I believe I am a better listener, communicator, and leader because of the things I learned during EPHLI this past year.

ABOUT THE EPHLI FELLOW

Mina Shehee currently serves as the supervisor of the Medical Evaluation and Risk Assessment Unit, Occupational and Environmental Epidemiology Branch, Epidemiology Section, Division of Public Health, North Carolina Department of Health and Human Services. She earned her undergraduate degree in Biology at Saint Cloud State University. After serving as a Chemical Officer in the U.S. Army, she earned her Masters of Medical Science degree in Clinical Microbiology at Emory University. She worked fifteen years at various medical centers across the southeast clinical microbiology. In 2002, she earned her doctorate in Environmental Science and Engineering at the University of North Carolina at Chapel Hill. She joined the staff in the Occupational and Environmental Epidemiology Branch serving as a public health epidemiologist in 2003.

REFERENCES

1. Healthy People 2010.
2. Healthy People 2020.
3. National Strategy to Revitalize Environmental Public Health Services, Centers for Disease Control and Prevention, A2003.
4. Environmental Health Competency Project: Recommendation for Core Competencies for Local Environmental Health Practitioners