Project Summary

Title: Providing Communities with the Ground Water Information Needed for Comprehensive Planning

Project ID: WR03R0007

Investigators:

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Period of Contract: July 1, 2003 to June 30, 2005

Background/Need: Communities which rely on ground water as their sole source of water need to factor the magnitude and limits of their resource and ways to protect it into their development plans. Most of these communities do not, partly because they don't understand their ground water supply and don't know what information they need or where to obtain it.

Wisconsin now requires that communities adopt a comprehensive plan. The rules make passing reference to water resources and ground water supply, but typically the plans only include very cursory reference to them. Land use plans are primarily driven by economics and transportation; rarely does water supply influence the end result.

Objective: The primary purpose of this study was to assess the water resources of a ground water using community and then to work with that community so that it could design a comprehensive land use plan that protects its water supply. An outcome from the process is development of the procedure needed to get the right ground-water information to the community.

Methods: The study was structured as a complete analysis of the quantity of the ground water resource in the study area. During the project, information was shared with Town officials in order for them to incorporate it into their planning and administrative processes. Once the state-funded project was completed, an assessment was made to determine which information was most relevant and usable from the community's perspective.

Richfield was openly receptive to the idea of the study and willing to consider incorporation of the information into their comprehensive land use plan. That planning process began shortly after the ground water project started. The Town instituted a 12 month moratorium on new developments to coincide with its planning process and, coincidentally, the first half of this project's study period.

This study determined the underlying hydrogeology and the main sources and sinks of ground water within the Town. It developed a full ground-water budget using a calibrated, steady state flow model. The PI then worked with the community to provide them the information, to interpret it for them, to aid in its incorporation into their planning, and to establish a mechanism to protect their resource into the future.

Results: Richfield's ground water is primarily recharged by rainfall and snowmelt within the Town. It discharges mainly to the Town's surface waters and surrounding communities. As a consequence, Richfield is in control of its own water supply and the impacts that human actions will have on its lakes, streams and wetlands.

Town leaders decided that they wanted to protect its supply and surface waters. With input from this project, they decided to do so by:

1. developing a land use plan which protects sensitive ground-water area (both sources and baselevels),
2. limiting population density so that the combined human and environmental demand for water would never exceed the lowest expected recharge inputs, and
3. adopting an ordinance that requires determination of both the water demand and anticipated drawdowns resulting from new developments beforehand and then rejects projects which do not meet prescribed, acceptable drawdowns.

Population density is limited within the community's land use zoning by requiring a relatively large individual lot size for residences and that new developments cluster structures in such a way that a minimum of 30% of the total development remains as green space. Water intensive commercial or industrial development is discouraged. A development which fails to meet drawdown limits (< 1 foot at any property boundary and < 0.5 feet at any perennial surface waterway) must be redesigned to augment natural recharge or reduce water demand before it will be accepted.

Communication with townspeople and their leaders is key to getting them to understand their water system and how best to manage it. In this project, we used articles in the town newsletter, presentations before the general public and at official town meetings and annual reports to get our concepts out. Discussions with the volunteer well owners was also a major factor, because they spread information among their neighbors. The project's final report is attached in Appendix II and is designed to provide information in simple verbiage and US measures. It is also posted on the Town's website.

Implications and Recommendations: The most important information needed by a ground-water community is a good understanding of the geology, sources, sinks and water balance of their aquifer system. Presentation and interpretation of this basic information helped residents and their leaders understand where their water comes from. Interaction with the users at all levels was also crucial in developing the awareness that led this community to create a long term plan and supporting laws to sustain their water supply for most, is not all, future conditions.

Our experience was that the ground water model was probably not necessary in the process and tended to be misunderstood by the public – as having greater predictive resolution than is actually possible. The next step in this process will be to convince other communities to repeat this study.

Related Publications: D. Alessi won best student poster presentation at Wisconsin Water Resources Assoc. March, 2005

Key Words: Ground Water Resources, Community Planning, Water Budget, Recharge

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