

Groundwater study leads to quality town plan



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Washington County is an urban county in south eastern Wisconsin. 100 percent of the county's drinking water is from groundwater. The soil has sand and gravel deposits interspersed in clay, which causes variation in groundwater recharge.

Issue: Lack of groundwater information during comprehensive planning

The Town of Richfield in Washington County, population 11,000 experienced rapid population growth during the early 2000s. All residences and businesses in the town use private wells and onsite septic systems for water supply and wastewater treatment, respectively.

The town was interested in obtaining better groundwater information to include in its comprehensive planning process. They were seeking information about the location of important recharge areas, water table elevation, groundwater recharge rates, water use and more. This information would be important for making land use decisions in the town.

Also in the early 2000s, the Department of Geosciences at the University of Wisconsin-Milwaukee (UWM) was seeking ways to apply its groundwater expertise to local issues.

Approach: Groundwater study in combination with comprehensive planning process

UWM proposed to conduct a groundwater sustainability study for the town if it would use the information in its plan. UWM had obtained a \$60,000 grant from the UW Groundwater Research and Monitoring Program and was looking for a community in need of groundwater information. Originally the study had been proposed in 1996 but the town had not been interested. However by 2003 when the study was proposed again, the town had experienced development pressures and was interested in obtaining more information about its groundwater resource.

If successful, the groundwater study protocol could be applied to other municipalities in need of similar information. The study conveniently coincided with the town's comprehensive planning

process. The town decided to put a 12-month moratorium on new development while the study was being conducted. They wanted all future development decisions to consider groundwater as well as their usual criteria for siting development.

The groundwater study designed by UWM consisted of:

- determining the hydrogeology of the town
- developing a water budget including:
 - developing water table maps using residential wells
 - measuring stream baseflows
 - estimating recharge rates and pumping rates
- calibrating a ground water flow model to test potential new development approaches
- interacting with leaders and citizens at every step¹

Definition of Hydrogeology

Interaction and effect of: soil types and distribution, bedrock material and depth, water table depth, and topography on groundwater infiltration, movement, availability, and susceptibility to contamination. Or, "determine the plumbing of the groundwater system".²

A UWM professor and three students gathered and analyzed the above information for the town. This work cost \$60,000 and took two years to complete. The groundwater information was incorporated in the comprehensive plan and influenced the town's goals and objectives.



View of a typical Town of Richfield neighborhood

Reflections on groundwater study

Strengths

The town did not have to pay for the study because it was funded by a grant. This probably helped with acceptability as well.

As a result of the information, Richfield is now planning to keep the density of development below what recharge can support and to protect sensitive areas like wetlands, lakes and recharge areas.¹ Knowing where sensitive areas are located has caused the town to rethink where commercial areas should be. The town also wants to maintain baseflow of its streams and now knows how much groundwater can be used without compromising streams.

Richfield has committed to continued groundwater monitoring and has adopted “conservation development” standards which reduce stormwater runoff and water use.

The town has adopted a Groundwater Protection Ordinance to:

- require developers to quantify water needs and impacts, which will be tested with the model;
- limit the maximum allowable drawdown caused by a new development to less than one foot at any development boundary and less than one half foot at any perennial surface water body.

Richfield has already used their new groundwater information in deciding on whether to allow a golf course expansion.

Weaknesses

This study did not address water quality in the town. Possible contamination is a factor that the town should know about when making land use decisions.

Applying the protocol

For communities that need to conduct a similar study, it would probably cost about \$60,000 but most communities could get by with a less in-depth study than Richfield. The most important information is the most basic and least costly. For instance, a community could use an existing water table map to assess present groundwater resources. Basic water table reports and maps of the entire state dated 1970s to

Sources

1. Cherkauer D. Incorporating groundwater sustainability into the comprehensive planning process. PowerPoint presentation. 2005.
2. Cherkauer D. personal communication. 2005 April.

1990s are available from the WDNR. These maps may be questionable depending on how recent they are and how the community’s wastewater is treated. If a community has private wells and waste treatment, the existing maps are probably accurate. Using existing water table maps would save around \$8,000 on the study.

The type of groundwater study Richfield conducted is even more necessary in communities that discharge their treated wastewater to surface water bodies or do not put it back into their aquifer system.

If a community is only interested in a snapshot of the present there is no need to build a groundwater model or to monitor homeowners’ wells; this approach can reduce the cost of the study by at least 50 percent.

However, to predict effects of future development a community needs a groundwater model. If they want to know what will happen in the future and how they can protect their groundwater quantity, a community needs to know what land uses to avoid and in what areas. This is especially the case when dealing with planning boards and developers where information is needed to address individual projects. For site level information, a community needs to determine the underlying hydrogeology; this has not been done on a community level in most areas of the state. Determining hydrogeology at a local level is a major time sink, taking more than six months in Richfield, but once completed will serve the community well in perpetuity.

Conclusion

Richfield residents and officials are pleased with how the study provided them with important information that can guide land use decisions. Temporarily, there was some inconvenience but the town can now be proactive with regard to decisions that affect its groundwater, rather than reactive, which is likely to occur when a community does not have the information that Richfield does.

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