International Water Resources Association
Water International, Volume 28, Number 2, Pages 170–180, June 2003

The Mahomet Aquifer
A Transboundary Resource in East-Central Illinois

David R. Larson, **Edward Mehnert**, *and* **Beverly L. Herzog**, *Illinois State Geological Survey, Champaign, Illinois, USA*

Abstract: *Emerging intrastate transboundary issues focus on use of the Mahomet aquifer, which underlies about fifteen counties and many other political entities in east-central Illinois. This sand and gravel aquifer in the lower part of the buried Mahomet Bedrock Valley ranges between four and fourteen miles wide and from about 50 to 200 feet thick. Much of the region's rural population, several large communities, and many small towns obtain water from the Mahomet aquifer, as do industrial, agricultural, and commercial users. Increased development of the Mahomet aquifer to meet growing demands for water has caused conflicts over real or perceived adverse effects. One result has been the creation of fifteen resource protection zones and twelve water authorities. For groundwater supplies, resource protection zones help municipalities protect water-supply wells from potential adverse impacts. Many resource protection zones overlap one another, however, so this situation could lead to disputes over use of the resource. The reason that several of the twelve water authorities were organized was to meet a challenge perceived from a demand to be placed on the aquifer, in other words, a potential for conflict of use. Complicating the situation is that some of the water authorities overlap the resource protection zones. This could lead to disputes not only about water use, but also over which jurisdiction has the authority to settle a dispute. The Mahomet Aquifer Consortium was recently organized by concerned people representing diverse groundwater interests at the local level, including the private sector, professional organizations, and various governmental units. The consortium brings together representatives of some groups that typically did not communicate with each other in the past. The consortium may provide a forum through which emerging transboundary issues pertaining to use of the Mahomet aquifer can be addressed. Because the consortium is a voluntary organization that relies on consensus building, the success it may achieve in resolving future conflicts over groundwater use from the Mahomet aquifer remains to be seen.*

Keywords: *Transboundary issues, Mahomet aquifer, Illinois, groundwater resources, groundwater competition, water-use conflicts, Mahomet Aquifer Consortium, buried bedrock valley aquifer.*

Introduction

Just as tensions between nations can be caused by competition for surface water crossing international boundaries, tensions can be generated at a local level among those that use a common water resource. This includes groundwater. Such is the case in east-central Illinois where the withdrawal of groundwater from the Mahomet aquifer has led to conflict in the past and has created the potential for future conflict. The Mahomet aquifer, one of several major sand and gravel aquifers in Illinois (Figure 1), is typically considered to be the best source for meeting potential demands for water, particularly if high-capacity wells are involved. The aquifer crosses the boundaries of fifteen counties (Figure 2) and many other political entities. Because the water pumped from the aquifer supplies several large communities, many small towns and rural residents, and industrial, agricultural (including irrigation), and commercial users, the rate at which it is pumped ranges from thousands to millions of gallons per day.

Competition for use of the resource has caused several disputes over actual or perceived adverse effects of new wells on existing ones. Because of the competition for the resource, the resulting potential for conflict, and the desire to exert local control over development of the resource, many individual local entities have been created most of which encompass relatively small areas. With each of these local entities attempting to achieve its own objectives and with little or no communication among them, uncoordinated management ensued. With increasing development of the Mahomet aquifer, the potential for conflict could intensify. In the absence of any groundwater resource management efforts at the state or regional levels, concerned people living in the area underlain by the Mahomet aquifer and representing diverse groundwater interests at the local level recently organized a consortium

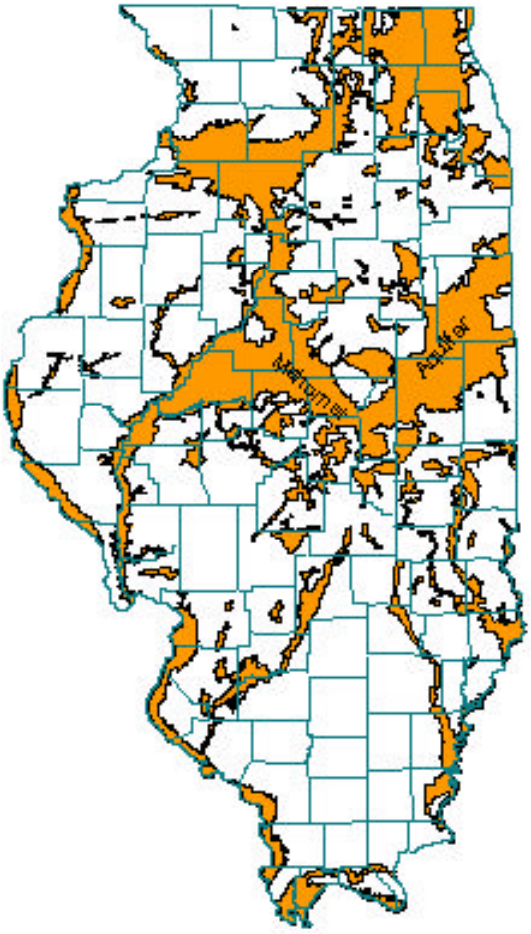

Figure 1. Major sand and gravel aquifers in Illinois and the location of the Mahomet aquifer.

as a means for cooperatively managing the resource and resolving conflicts. The purpose of this paper is to characterize the Mahomet aquifer, describe some of the sources of the potential for conflict over use of this resource, and discuss the group that was organized.

Hydrogeologic Setting of the Mahomet Aquifer in East-Central Illinois

The Mahomet aquifer consists of sand and gravel deposited during the pre-Illinois Glacial Episode by meltwater flowing westward along the Mahomet Bedrock Valley (Figure 3). This bedrock valley, incised mostly into Pennsylvanian shales, forms the western part of the Teays–Mahomet Bedrock Valley System that extends into Illinois from Indiana and possibly Ohio and West Virginia. Most of the sand and gravel of the Mahomet aquifer belongs to the Mahomet Sand Member, the lithostratigraphic unit that comprises the lower half of the Banner Formation (Figure 4). The rest of the Banner Formation consists mostly of the Hillery and overlying Tilton Members, two till units that overlie and form the confining unit for the Mahomet (Figure 4). A buried paleosol, the Lierle Clay, locally marks the top of the Banner Formation (Figure 4). Where the paleosol is absent, the Banner Formation directly underlies the younger Glasford Formation (Figure 4). The Banner Formation was deposited more than 500,000 years ago (Soller et al., 1999).

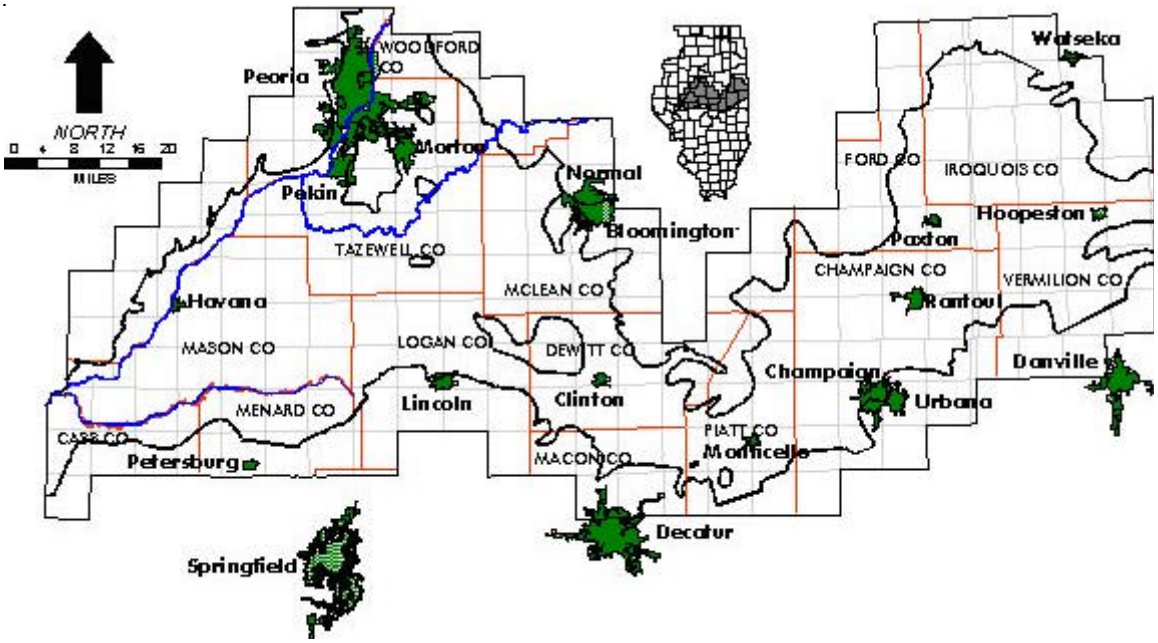

Figure 2. Mahomet aquifer region of east-central Illinois (Mehnert et al., 2000). Edge of the aquifer is based on the 500-foot bedrock-surface elevation contour.

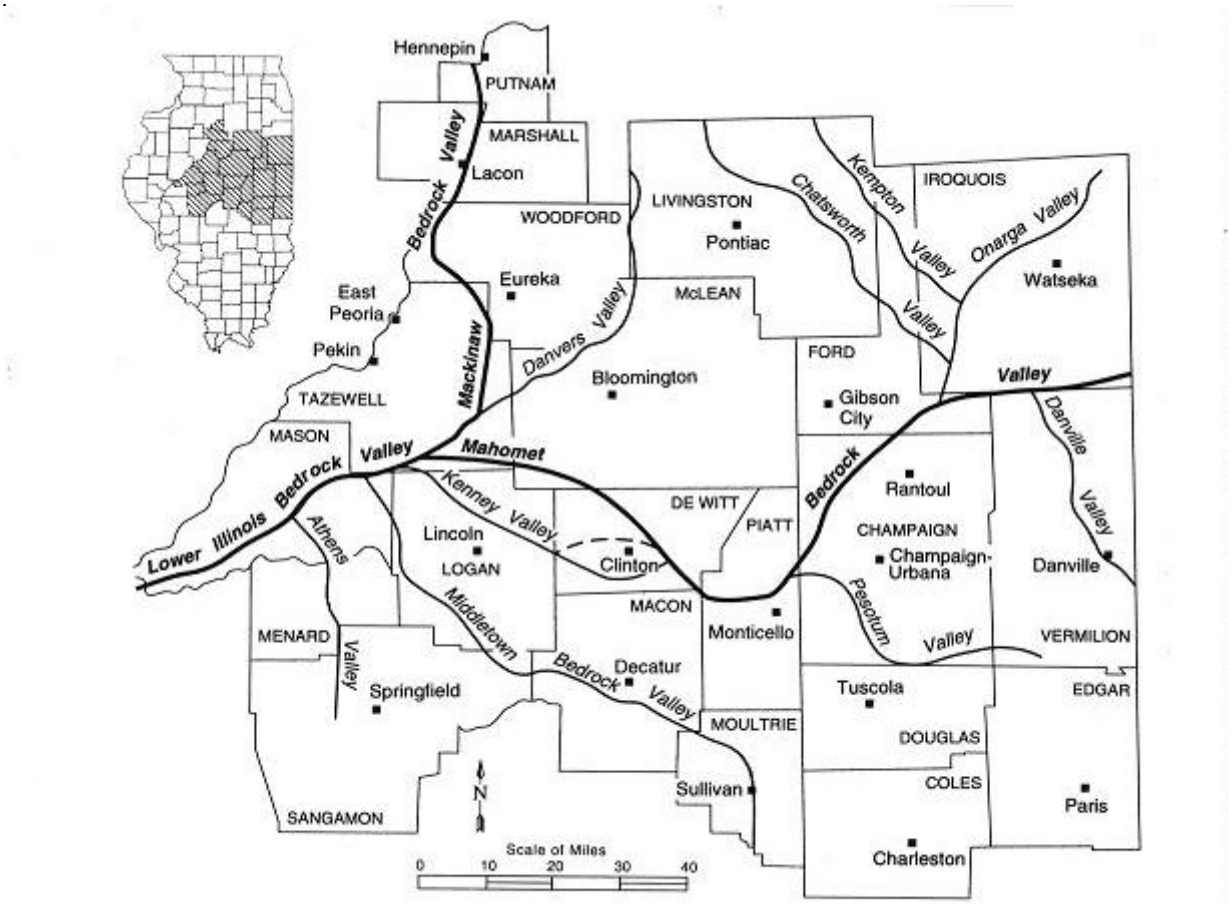

Figure 3. Mahomet Bedrock Valley and principal tributaries in east-central Illinois (from Kempton et al., 1991 and Burch and Kelly, 1993).

The Mahomet aquifer trends east-to-west across east-central Illinois in a broad arc (Figure 1). The aquifer is under confined conditions, except at its west end in Mason, Menard, and Tazewell Counties where it crops out at land surface and is unconfined (Figure 2). Width of the Mahomet aquifer typically ranges between four and fifteen miles, but the aquifer tends to be somewhat wider than fifteen miles to the northeast (Figure 5). It is narrowest at the apex of the arc where the trend of the aquifer turns from northeast-southwest to northwest-southeast (Figure 5). Although thickness of the aquifer averages about 100 feet (Figure 5), it ranges from less than 50 feet to about 200 feet. Lacustrine sediments are generally found instead of sand and gravel near the base of the aquifer (Figure 4) and at the margins of the Mahomet Bedrock Valley where the aquifer is thin (Figure 5). Some hills in the bedrock surface along the middle of the Mahomet Bedrock Valley are high enough so that the Mahomet aquifer is absent at these locations. Deposits of sand and gravel locally occur between the two till members in the upper Banner Formation, and between the Banner and overlying Glasford Formation (Figure 4). These deposits are typically 25 feet thick, but may exceed 50 feet at some locations (Wilson et al., 1998). These deposits are locally significant sources of groundwater for small community and domestic wells. Some drillers' logs suggest these deposits are hydraulically connected to the Mahomet aquifer at a few locations, thereby increasing the effective thickness of the aquifer.

The Glasford Formation and the overlying Wedron Group are the other two major glacial units in east-central Illinois. The Glasford Formation, which was deposited between 180,000 and 125,000 years ago during the Illinois Glacial Episode (Soller et al., 1999), directly overlies the Banner Formation (Figure 4). The top of the Glasford is marked by a distinctive, organic-rich paleosol in much of Illinois. Two till units, the Vandalia and overlying Radnor Members, make up most of the Glasford Formation (Figure 4). Deposits of sand and gravel occur at the base of the Vandalia and between the two till units (Figure 4). Although typically thin and of limited areal extent, these deposits form locally important aquifers that are the source of supply for small community and domestic wells. At some localities, the sand and gravel deposits at the base of the Vandalia are hydraulically connected with the Mahomet aquifer because the Hillery and Tilton Members are absent and the top of the Mahomet aquifer is relatively high. The Wedron Group (Figure 4), which was deposited during the Wisconsin Glacial Episode between 25,000 and 12,000 years ago (Soller et al., 1999), contains thin beds of

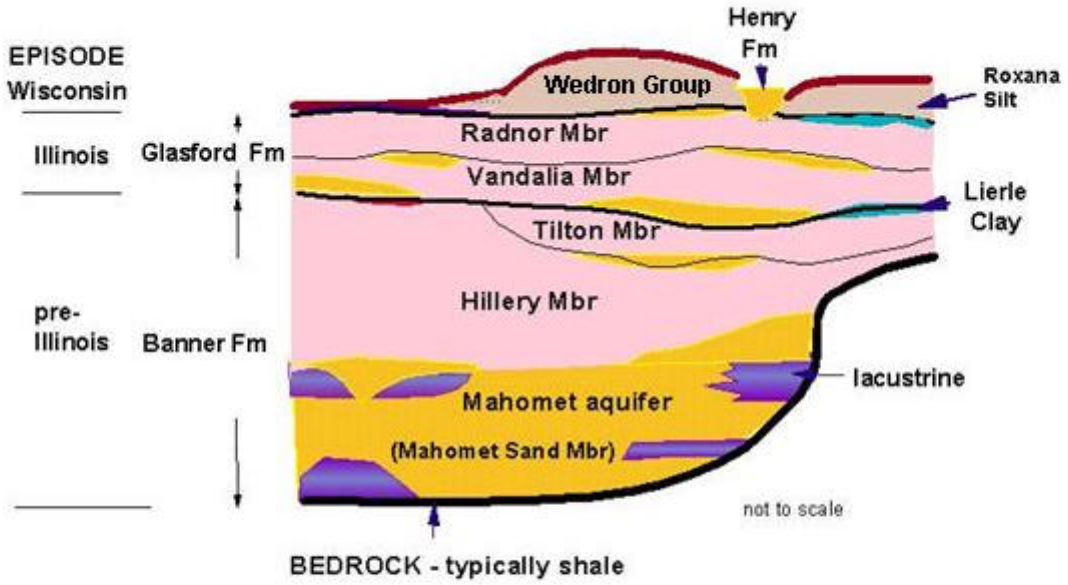

Figure 4. Sediments and stratigraphic position of the Mahomet aquifer in the Mahomet Bedrock Valley (from Herzog et al., 1995).

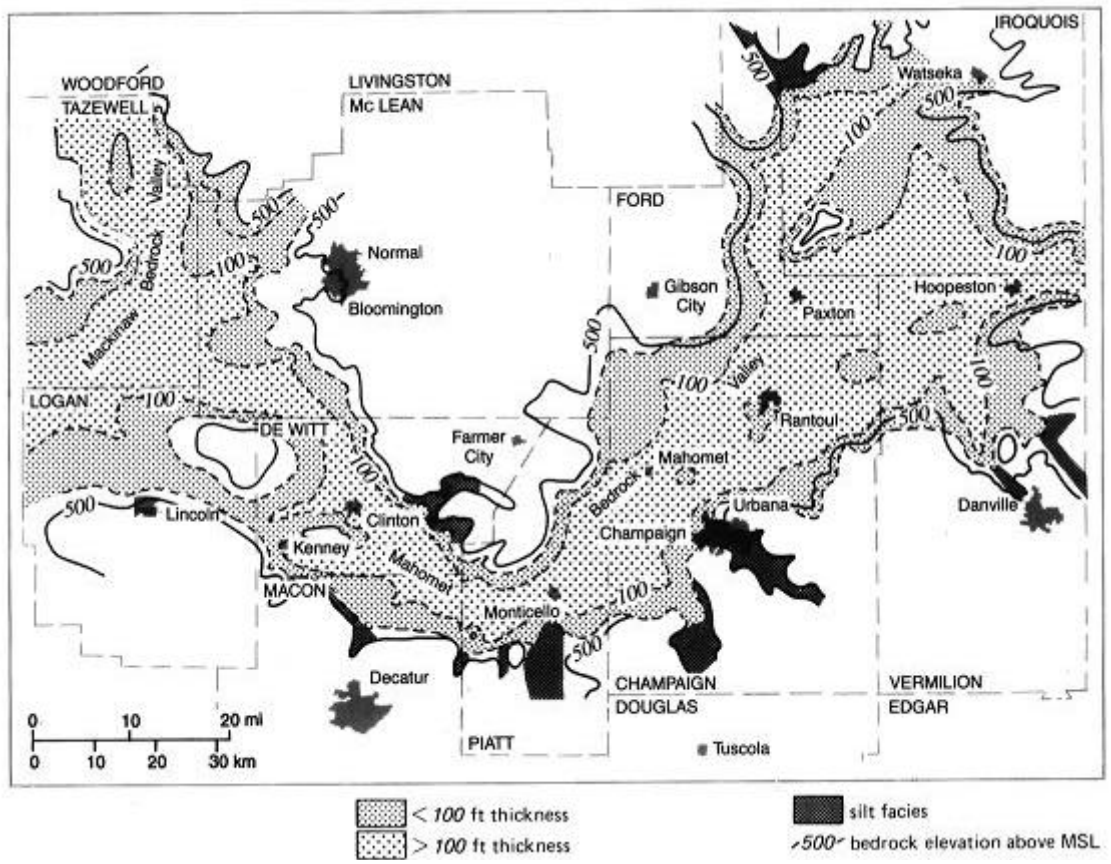

Figure 5. Regional width and thickness of the Mahomet aquifer (Kempton et al., 1991).

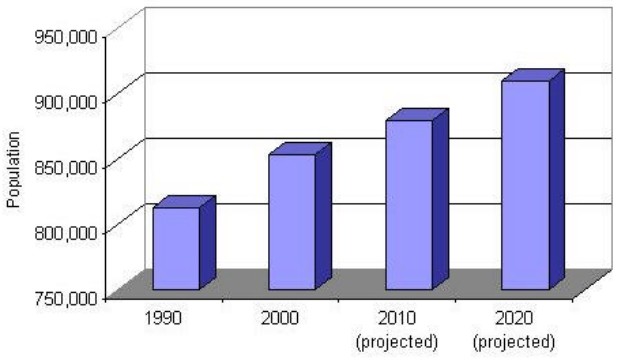

Figure 6. Trend in population growth in the Mahomet aquifer region, 2010 and 2020; data from the Illinois State Bureau of the Budget.

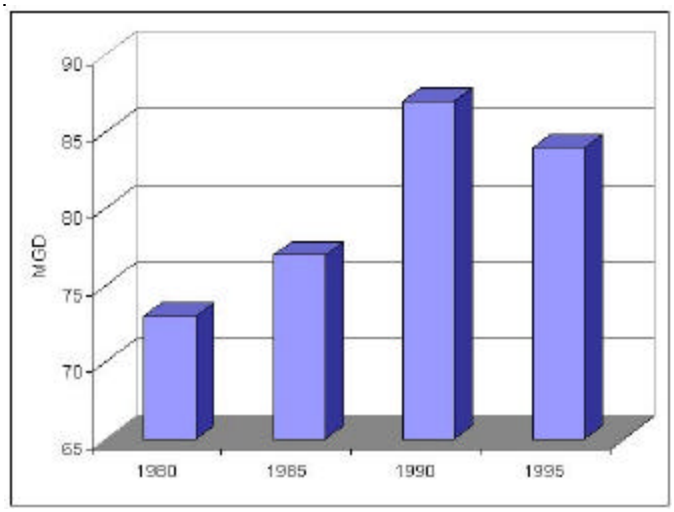

Figure 7. Total annual municipal, industrial, and commercial water use from the Mahomet aquifer; data from the Illinois State Water Survey.

sand and gravel that commonly extend over small areas. The Mahomet aquifer, plus aquifers in the Glasford and upper Banner Formations, and the minor aquifers in the Wedron Group comprise the Mahomet Bedrock Valley aquifer system (Water Resources Center, 1997).

Groundwater Use

According to census data, the population of the Mahomet aquifer region is growing. It increased from a total of about 813,000 in 1990 to about 845,000 in 2000 (Figure 6). The Illinois Bureau of the Budget projected the population to increase to about 880,000 by 2010 and about 910,000 by 2020 (Figure 6). Groundwater is pumped from the Mahomet aquifer to meet the water-supply needs of rural domestic, municipal, industrial, agricultural, and commercial users. The demand for water tends to be increasing for all of these uses, but information is available only for groundwater used for municipal, industrial, and commercial purposes (Figure 7).

Rural residents who live within the boundaries of the Mahomet aquifer obtain their water from this source if shallower aquifers are not present or are too thin to be a viable source of water. The rural population is growing, in part because people are moving into the country near the larger communities. Additional groundwater will be pumped from the Mahomet and shallower aquifers to meet the needs of a growing rural population. The Mahomet aquifer is the source of supply for several large communities and a number of small towns and villages located within the aquifer boundaries. In addition, groundwater from the aquifer is piped to several other large communities as well as small towns and villages that do not overlie the aquifer, but are located close enough to the edges of the aquifer to make transporting the water economically feasible. The demand for water from the Mahomet aquifer for municipal use could increase. A few large communities located adjacent to the edges of the aquifer currently use surface water as a source of supply. These communities view the Mahomet aquifer as a source of supplemental supply that can be used to blend with their surface-water supplies in order to meet drinking water standards (e.g., nitrate), or to meet additional demand during drought conditions. At least one city with a population of about 58,000 is considering shifting from surface water to the Mahomet aquifer as the source of supply. Large communities that have tapped the Mahomet, or are considering doing so, have a total population of about 274,000 people.

Besides the increasing domestic and municipal demands for water, industrial needs are growing. For example, ethanol production in the region may rise sharply to supply the demand for gasoline additive. In the agriculture sector, large new facilities for raising and processing livestock are being developed. There has been a steady growth in irrigation in the region. At one time, the western end of the Mahomet aquifer region was the only area that was irrigated. Irrigation wells can now be found at locations in every county overlying the aquifer.

Groundwater withdrawals in Illinois came under the rule of reasonable use by the Water Use Act of 1983 (Illinois Compiled Statutes, 2002a). The Act defined reasonable use as "the use of water to meet natural wants and a fair share for artificial wants." The definition specifically states that it does not include water used wastefully or maliciously. The Act established a process through which potential water conflicts could be reviewed before damage occurred. County Soil and Water Conservation Districts were authorized to receive notice of incoming substantial users of water, conduct a review of the effects the proposed withdrawal may have on other users of the water, and make public the findings of the reviews. Substantial users were defined as those who expect to withdraw groundwater in excess of 100,000 gallons per day. This process only allows possible water-use conflicts to be publicaly disclosed because the Water Use Act of 1983 did not authorize the Soil and Water Districts to manage

the resource in order to mitigate well interference effects. The Act did authorize eight of the 98 Districts in Illinois to recommend to the Illinois Department of Agriculture temporary restrictions on water use, but only in response to a written complaint submitted by an injured party whose well fails to furnish its normal supply. The Mahomet aquifer underlies five of these eight Districts that can recommend restrictions in water use.

Competition for Groundwater

Until the drought of 1988–1989, there was little concern about the amount of water available from the Mahomet and the other aquifers in the Mahomet Bedrock Valley aquifer system. It was thought that groundwater was plentiful. Visocky and Schicht (1969) estimated that about 445 million gallons per day (mgd) were available for use. In calculating their estimate, they assumed that 60 percent of groundwater runoff (Walton, 1965) could be diverted into the cones of depression around pumping centers (Zeizel et al., 1962). Although the amount of groundwater pumped from the aquifer system in the drought year of 1988 totaled about 85 mgd, or less than 20 percent of the available water (Water Resources Center, 1997), the drought heightened awareness of the importance of groundwater, and in particular the Mahomet aquifer, to the social and economic well being of east-central Illinois.

Competition for groundwater in the Mahomet aquifer has resulted in conflicts over water use arising from real or perceived adverse effects of additional withdrawals on existing wells. For example, shortly after the wells in the west well field for Normal, Illinois began pumping water to supply water to Normal, well interference effects caused the water levels in nearby shallower domestic wells to be much lower. In some wells the decline was enough so that the wells went dry (Richards and Visocky, 1982). Publicity of these adverse effects increased public awareness of what could happen from a high-capacity well. As development of the Mahomet aquifer continues, which will include new high-capacity wells, disputes will undoubtedly become more frequent. Integral to resolving conflicts over groundwater use are increasing the public's understanding of groundwater flow and availability in the Mahomet aquifer, and of the effects caused by pumping water from an aquifer, especially the effects produced by a high-capacity well. Increased awareness and insight into the social and economic dynamics inherent in the competition for groundwater are also needed.

Lack of understanding about the amount of groundwater available is evident and shows the need for continued efforts to educate the public. "Stealing my water" is a phrase that is commonly heard at public information meetings, for example, where proposed groundwater withdrawals are discussed. It exemplifies the social and economic dynamics of the competition for water and the fear that unknown adverse impacts will be detrimental. Further discussion concerning ways to increase public understanding of groundwater, or of the social and economic dynamics of resource competition is beyond the scope of this paper, but it should be recognized that they are inherent in transboundary issues presented in this paper.

Resource Protection Zones

Resource protection zones have been formed because of concerns, particularly those of smaller communities, over the potential for adverse impacts to groundwater supplies (Water Resources Center, 1997). By using the part of the Illinois Municipal Code that pertains to wells and waterworks, fifteen communities have sought to reduce the potential for adverse impacts to their supply wells by controlling development of the groundwater resource in an area (resource protection zone) adjacent to their municipal boundaries (Figure 8). Section 11-125-2, Division 125 of the Municipal Code (Construction of Wells and Waterworks by Cities and Villages) stipulates that the "jurisdiction of a city or village to prevent or punish any pollution or injury to the stream or source of water, or to waterworks, extends 20 miles beyond its corporate limits, or so far as the waterworks may extend" (Illinois Compiled Statutes, 2002b). Similarly, Section 11-126-4, Division 126 (Joint Construction of Water Supply) specifies that the jurisdiction extends only 10 miles if the waterworks are developed jointly by adjacent municipalities (Illinois Compiled Statutes, 2002b). For a source of supply using groundwater, "injury to the source of water" could be interpreted as well interference, diminished well efficiency, or some other adverse impact caused by present or potential resource developments (Water Resources Center, 1997). Although resource protection zones have been established, using the provisions of the Municipal Code to resolve conflicts over water use could be problematic because the code does not define "injury" to the source of water, nor does it specify the powers a city or village can exercise to "prevent or punish pollution or injury" to the source of water.

Two of the larger communities in east-central Illinois, Normal and Clinton, have established resource protection zones with a radius of twenty miles, the maximum allowed (Figure 8). Six communities used a radius of ten miles for their protection zones, and one community each used a radius of four and two miles for their zones (Figure 8). Five of the communities established the limits of their protection zones based on township boundaries (Figure 8). Two of these five communities included two townships in their zones; the other three included just the township in which they are located. Many of the resource protection zones overlap each other, especially the larger with the smaller zones, as described below (Figure 8). In addition, many of the zones not only include part of the county in which the community is located, but also parts of the adjoining counties (Figure 8).

The resource protection zone for Normal is one of the two largest zones (Figure 8). It overlaps Clinton's zone as well as the ten-mile radius zone for Carlock, the four-mile radius zone for Gridley, and the township zones for Mackinaw and Minier. In addition to most of McLean County where Normal is situated, Normal's protection zone includes parts of five other counties (Figure 8). The resource protection zone for Clinton, a community of about 8,000 located in DeWitt County, overlaps Normal's zone plus the ten-mile radius zones for Weldon, Deland, Monticello, Cisco, and Argenta (Figure 8). Besides almost all of DeWitt County, Clinton's zone includes parts of four other counties (Figure 8). The ten-mile zone for Carlock lies within Normal's twenty-mile zone, overlaps Mackinaw's township zone, and adjoins Minier's township zone (Figure8). Although Carlock is located in McLean County, its zone also includes parts of two other counties (Figure 8). Gridley is a small community located in McLean County near the Livingston County line (Figure 8). Even though with a four-mile radius its protection zone is one of the smallest, its zone overlaps that of Normal and includes parts of three counties (Figure 8). The ten-mile radius resource protection zones for Weldon, Deland, Monticello, Cisco, and Argenta not only overlap each other, but also overlap Clinton's zone (Figure 8). The zones for Weldon, Cisco, and Argenta include parts of three counties while those for Deland and Monticello include parts of four counties (Figure 8).

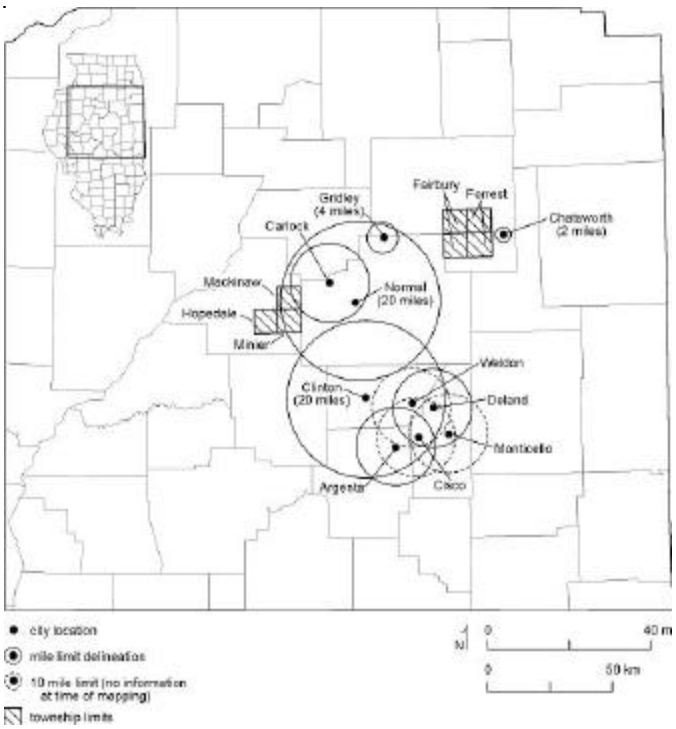

Figure 8. Location and extent of resource protection zones in east-central Illinois (Water Resources Center, 1997).

Water Authorities

Concerns about the potential for adverse impacts to groundwater supplies have resulted in the organization of twelve water authorities, one of which (the Mahomet Aquifer Water Authority) is inactive (Figure 9). Unlike the resource protection zones, the powers and duties of water authorities are specifically mentioned in the Water Authorities Act (Illinois Compiled Statutes, 2002c). A water authority is a contiguous area established for purposes of monitoring and controlling the development of the area's groundwater resource through its board of trustees. The powers of a board of trustees are considerable (Illinois Compiled Statutes, 2002c). They include the following:

- inspect wells;
- gather information about the supply, withdrawal, and use of the water;
- require the registration of existing wells;
- require permits for new wells or changes to existing wells;
- require wells to be repaired to prevent water loss or contamination;
- require abandoned wells to be plugged;
- reasonably regulate the use of water;
- establish limits or priorities on the use of water during periods of actual or threatened water shortage; and
- enforce all ordinances through water authority police.

Water authorities have no jurisdiction over groundwater used for agricultural purposes including irrigation, or for domestic purposes where four families or fewer are supplied from the same well (Illinois Compiled Statutes, 2002c). By excluding the groundwater used for agricultural purposes from a water authority's jurisdiction, the alternatives and actions that a board of trustees may consider in developing management strategies to reasonably regulate any beneficial use of the resource or address water-use conflicts is constrained.

After the drought of 1988-1989, several larger cities in east-central Illinois evaluated the use of groundwater to supplement their surface-water supplies to reduce the sensitivity of the supply to variations in precipitation or mitigate changes in surface-water quality. Most of the twelve water authorities were organized during this time for a single purpose–to provide local control for managing the perceived effects from the new demand placed on the groundwater resource. For example, the water-supply company in Danville, Illinois was evaluating the feasibility of using groundwater to supplement its surface-water supply when nitrate concentrations exceeded the drinking water standard. Residents in Blount and South Ross Townships, fearful that Danville would be "stealing" their groundwater, organized the Blount Township and South Ross Township Water Authorities to control, that is to say, prevent this development (Figure 9). The Hudson Township Wa-

ter Authority is another example of a water authority organized for a single purpose (Figure 9). In its search for additional water, the city of Normal was evaluating the extent and availability of groundwater in Hudson Township, which is located north of the city. Township residents were fearful that Normal was trying to "steal" their water. Consequently, they organized the Hudson Township Water Authority.

The water authorities in east-central Illinois, ranging in size from a single township to almost two counties, can be clustered into three groups (Figure 9). The east group is located near the Indiana state line and includes Blount Township and South Ross Township Water Authorities. The total area within these two single-township water authorities is about 106 square miles (Table 1). The middle group, which generally overlies the Mahomet aquifer, includes seven active water authorities and the one inactive authority. Three of the active authorities encompass just a single-township (Figure 9). The Mahomet Valley Water Authority is the largest, extending for 812 square miles (Figure 9). The seven active water authorities in this group contain a total of about 1579 square miles. The area included in the two water authorities of the west group totals about 1026 square miles. The reach of the Mahomet aquifer underlying the Imperial Valley Water Authority is shallow and unconfined. Because groundwater is readily available and the soils within the Imperial Valley Water Authority are very sandy, the area is extensively irrigated with center-pivot systems.

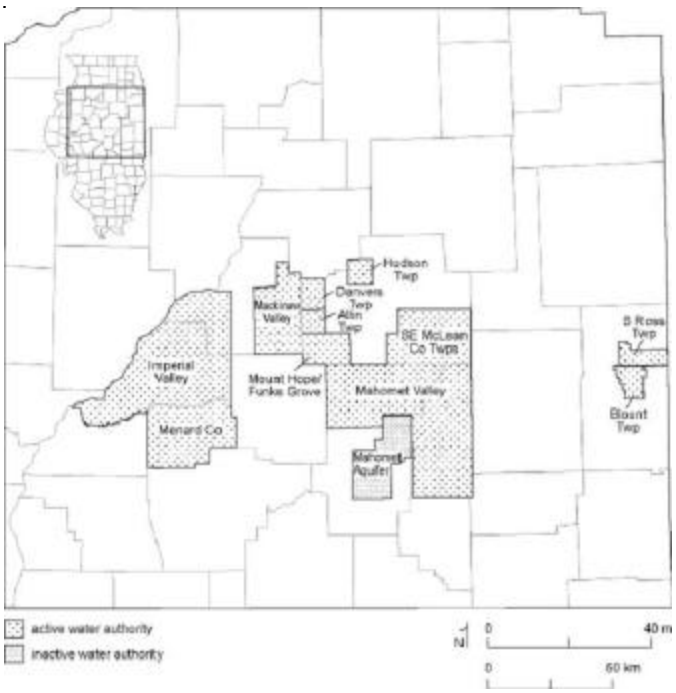

Figure 9. Location and extent of water authorities in east-central Illinois (Water Resources Center, 1997).

Table 1. Approximate Areal Extent of Water Authorities in East-Central Illinois

Water Authority	*Group*	*Approximate Areal Extent (square miles)*
Blount Township	East	51
South Ross Township	East	55
SE McLean County Townships	Middle	334
Mahomet Valley	Middle	812
Hudson Township	Middle	37
Danvers Township	Middle	44
Allin Township	Middle	35
Mount Hope/Funks Grove Township	Middle	93
Mackinaw Valley	Middle	224
Mahomet Aquifer (inactive)	Middle	236
Imperial Valley	West	710
Menard County	West	316

Overlap of Jurisdictions

All but four of the fifteen resource protection zones in east-central Illinois overlap areas under water-authority jurisdiction (Figure 10). These four zones are Gridley, Fairbury, Forrest, and Chatsworth (Figure 10). Normal's twenty-mile radius protection zone overlaps seven water authorities; Clinton's twenty-mile radius zone overlaps three. All of the ten-mile radius zones overlap at least two water authorities, including the inactive water authority. Carlock's zone overlaps the jurisdictional areas of four water authorities (Figure 10).

The jurisdictional areas of all of the water authorities in the middle group overlap resource protection zones (Figure 10). The Mahomet Valley Water Authority, the largest one in the middle group, has a total of seven resource protection zones that overlap its area of jurisdiction. These are the twenty-mile zones of Normal and Clinton and the ten-mile zones of Weldon, Deland, Monticello, Cisco, and Argenta. The Mackinaw Valley Water Authority, which is about one-third the size of the Mahomet Valley Water Authority, overlaps Normal's twenty-mile radius zone and Carlock's ten-mile zone, plus the three township-limit zones for mackinaw, Hopedale, and Minier (Figure 10). The jurisdictions of three of the single-township water authorities (Hudson, Danvers, and Allin) overlap Normal's twenty-mile protection zone and Carlock's ten-mile zone.

Not only do many of the resource protection zones overlap each other as well as areas under water authority jurisdiction, nine of the fifteen zones extend into the counties adjoining the county in which the community is located (Figure 8). Of the water authorities, only the Mahomet Valley and the Imperial Valley Water Authorities include more than one county. County boards can exercise some jurisdiction over groundwater use within their respective counties (Illinois Compiled Statutes, 2002d). County Soil and Water Conservation Districts also have the authority to manage groundwater withdrawals within their counties.

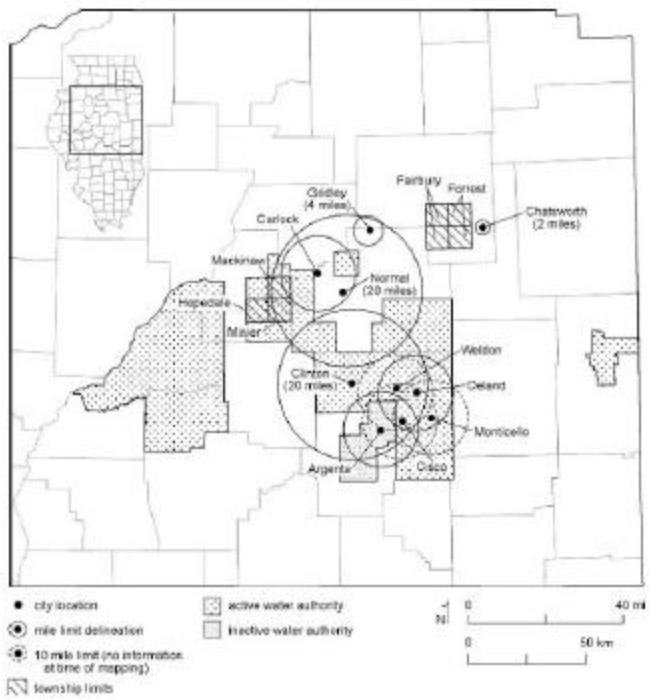

Figure 10. Jurisdictional overlap of water authorities and resource protection zones. Water authorities are identified in Figure 9.

Among the resource protection zones, water authorities, county boards, and the county soil and water conservation districts, only the water authorities are specifically empowered by the enabling legislation to regulate the use of groundwater or establish limits and priorities on water use during threatened or actual water shortages. The Water Authorities Act does not address groundwater management or resolving conflicts of water use. The Municipal Code and Counties Code Act provide only for the making of rules and regulations with respect to waterworks. Similar to the Water Authorities Act, these codes do not address groundwater management or conflict of use. The overlap of jurisdictional areas and the ambiguity of authority to settle disputes could lead to more conflicts over groundwater availability and use. Increased conflict would most likely occur during droughts if people felt compelled to protect their water supplies. This has happened already as a consequence of the drought of 1988–1989 and mentioned above. In the longer term, disputes may occur as the limits of groundwater availability from the Mahomet aquifer are approached.

Mahomet Aquifer Consortium

In the absence of a strong impetus for management of groundwater quantity at the state level, stakeholders interested in the Mahomet aquifer took steps in this direction at the local level by organizing the Mahomet Aquifer Consortium in 1998. The consortium adopted a mission to further study the Mahomet aquifer on a regional basis and develop a plan for managing this valuable resource. The organizers recognized that resolving conflicts over groundwater use would require increased awareness and participation by a broad range of water users (Samson and Charrier, 1997). This was recently articulated in the first principle for action by the 12th Stockholm Water Symposium, that governance of water resources requires the involvement of the water users (Stockholm International Water Institute, 2002).

Members of the consortium, currently numbering about 80, represent the general public; private enterprise; county, state, and federal agencies; agriculture; water authorities; municipalities; and professional organizations. By bringing together a diversity of groups, several of which did not usually communicate with each other very well in the past, the consortium provides a forum that should help foster communication about for the Mahomet aquifer and resolving water-use conflicts on the basis of science and not litigation. The concerns about water quantity were expressed by the consortium in terms of reasons for studying the aquifer:

- informed decisions can be made about managing the resource to meet future water demands,
- water supply for the future can be ensured,
- water supply costs can be optimized, and
- economic development can be planned and promoted.

Communication among stakeholders, as well as education about the Mahomet aquifer and groundwater in general, are essential to achieving awareness, participation, and groundwater management. Since its inception, the consortium has been pursuing the funds and support needed for regional investigations of the aquifer. It has also initiated an educational program to improve the public's understanding of groundwater, the Mahomet aquifer, and the socioeconomic well being of east-central Illinois. The consortium endeavors to be a vehicle through which emerging transboundary issues pertaining to use of the Mahomet aquifer can be addressed. Because the consortium is a voluntary organization that relies on consensus in making its decisions, the success it may achieve in resolving future conflicts over the use of groundwater from the Mahomet aquifer remains to be seen. Its first test is more likely to come during a drought as members work to assure water supplies.

Conclusions

Much of east-central Illinois is underlain by the Mahomet aquifer, a prolific groundwater resource used by several large communities, many small towns and rural residents, and industrial, agricultural (including irrigation), and commercial users. Even though the resource is productive, tensions can be generated at a local level among those that use the resource similar to the tensions between

nations caused by competition for surface water crossing their boundaries. Withdrawal of groundwater from the Mahomet aquifer has in fact led to conflict over water use, thus creating the potential for future conflict.

The desire to exert local control over development of the Mahomet aquifer caused many individual local resource protection zones and water authorities to be created. Uncoordinated management of the aquifer is the result of each local entity attempting to achieve its own objectives with little or no communication with the other entities. Faced with the prospect of increasing development of the resource, concerned people who represent a diversity of groundwater interests at the local level recently organized the Mahomet Aquifer Consortium as a means for cooperatively managing the resource and resolving conflicts. The consortium is a voluntary organization that relies on consensus in making its decisions. Consequently, its success in resolving future conflicts over groundwater use from the Mahomet aquifer is far from assured.

About the Authors

David R. Larson (PG) holds an MS in Geology from the University of Nebraska–Lincoln. He has more than 25 years of experience in groundwater resource investigations with the Nebraska Geological Survey, North Dakota State Water Commission, and most recently with the Illinois State Geological Survey. Among his principal research interests are groundwater resource planning and management. He can be contacted at the Groundwater Geology Section, Illinois State Geological Survey, 615 East Peabody Drive, Champaign, Illinois 61820 USA. Phone: 217-244-2770; email: dlarson@isgs.uiuc.edu.

Edward Mehnert is a Geohydrologist and Head of the Groundwater Geology Section, Illinois State Geological Survey. He received a Ph.D. in Civil Engineering from the University of Illinois at Urbana-Champaign. His research interests include aquifer characterization and fate and transport of agricultural chemicals in groundwater. He can be reached at the Groundwater Geology Section, Illinois State Geological Survey, 615 East Peabody Drive, Champaign, IL 61820. Phone: 217-244-2765; fax: 217-244-2785; email: mehnert@isgs.uiuc.edu.

Beverly Herzog is a senior hydrogeologist and Director of the Environmental Geoscience Center, Illinois State Geological Survey, 615 East Peabody Drive, Champaign, Illinois 61820 USA. She has an MS degree in hydrology from Stanford University, and more than 20 years of experience in groundwater research. She is a Certified Groundwater Professional and is a member of the AGSWE board. Phone: 217-244-2788; fax: 217-244-2785; email: herzog@isgs.uiuc.edu

Discussions open until December 1, 2003.

References

Burch, S.L. and D.J. Kelly. 1993. "Peoria-Pekin Regional Groundwater Quality Assessment." Illinois State Water Survey research report 124: 86 pages.

Herzog, B.L., S..D. Wilson, D.R. Larson, E.C. Smith, T.H. Larson, and M. L. Greenslate. 1995. "Hydrogeology and Groundwater Availability in Southwest McLean and Southeast Tazewell Counties, Part 1. Aquifer Characterization." Illinois State Geological Survey and Illinois State Water Survey Cooperative Groundwater Report 17: 70 pages.

Illinois Compiled Statutes. 2002a. *Water Use Act of 1983*. P. A. 92-853 (525 ILCS 45/).

Illinois Compiled Statutes. 2002b. *Illinois Municipal Code*. P. A. 92-853 (65 ILCS 5/).

Illinois Compiled Statutes. 2002c. *Water Authorities Act*. P. A. 92-853 (70 ILCS 3715/).

Illinois Compiled Statutes. 2002d, *Counties Code Act*. P. A. 92-853 (55 ILCS 5/).

Kempton, J.P., W.H. Johnson, P.C. Heigold, and K. Cartwright. 1991. "Mahomet Bedrock Valley in East-Central Illinois: Topography, Glacial-Drift Stratigraphy, and Hydrogeology." In *Geology and Hydrogeology of the Teays-Mahomet Bedrock Valley System: Geological Society of America* Special Paper 258. W.N. Melhorn and J.P. Kempton, eds.: 128 pages.

Mehnert, E., D.R. Larson, M. Heidari, H.A. Wehrmann, and K.L. Warner. 2000. "The Mahomet Aquifer Consortium-Progress in Water Resources Management through Knowledge and Cooperation." ISGS/ISWS Poster presented at the Illinois Water 2000 Conference, Illinois Water Resources Center, University of Illinois at Urbana-Champaign, November 13–14, 2000. Holiday Inn Conference Center, Urbana, Illinois.

Melhorn, W.N. and J.P. Kempton, eds. 1991. *Geology and Hydrogeology of the Teays-Mahomet Bedrock Valley System.* Geological Society of American Special Paper 258: 128 pages.

Richards, S. S. and A. P. Visocky. 1982. "A Reassessment of Aquifer Conditions West of Normal, Illinois." Illinois State Water Survey Circular 153.

Samson, P. and B. Charrier. 1997. *International Freshwater Conflict: Issues and Prevention Strategies*. Geneva, Switzerland: Green Cross International.

Soller, D.R., S.D. Price, J.P. Kempton, and R.C. Berg. 1999. Three-Dimensional Geologic Maps of Quaternary Sediments in East-Central Illinois: USGS Geologic Investigations Series, Map I-2669, 3 sheets.

Stockholm International Water Institute. 2002. "Urgent Action Needed for Water Security; Recommendations from the Stockholm Water Symposia, 1998–2002: 2002 Stockholm Statement." 12th Stockholm Water Symposium, Stockholm, Sweden.

Visocky, A.P. and R.J. Schicht. 1969. "Groundwater Resources of the Buried Mahomet Bedrock Valley:" Illinois State Water Survey Report of Investigation 62.

Walton, W.C. 1965. "Groundwater Recharge and Runoff." Illinois State Water Survey Report of Investigation 48.

Water Resources Center. 1997. "The Mahomet Bedrock Valley Aquifer System; Knowledge Needs for a Vital Resource." University of Illinois Urbana-Champaign Water Resources Center Special Report 21.

Wilson, S.D., G.S. Roadcap, B.L. Herzog, D.R. Larson, and D. Winstanley. 1998. "Hydrogeology and Ground-Water Availability in Southwest McLean and Southeast Tazewell Counties; Part 2 – Aquifer Modeling and Final Report." Illinois State Water Survey and Illinois State Geological Survey Cooperative Groundwater Report 19.

Zeizel, A.J., W.C. Walton, R.T. Sasman, and T.A. Prickett. 1962. "Groundwater Resources of DuPage County, Illinois." Illinois State Water Survey and Illinois State Geological Survey Cooperative Groundwater Report 2.