Department of History
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“Water, Water Everywhere: The Path of Groundwater Quantity in Wisconsin”

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Introduction

Groundwater is a multi-layered topic which contains many interrelated aspects. Each component of groundwater warrants a separate discussion. To go in-depth on the subject one must touch on the other aspects for a better understanding of groundwater quantity in Wisconsin. In this case, I am looking intently at groundwater quantity mainly through government publications. Included in the bibliography are several newspaper articles which were initially intended to be a part of this paper, but a thorough analysis of newspaper coverage would be much too vast, and only skimming the surface of those sources would do little to enhance this paper. The literature on groundwater has grown exponentially in the past twenty years as more issues have been identified both at the state and federal levels. This paper is intended to give the reader a look into how groundwater was discussed in the past, what Wisconsin has done to protect its groundwater in terms of laws, and to illustrate the long, overdue process that groundwater quantity took in order to be protected by the State. The topic of groundwater in and of itself contains numerous sub-categories which each warrant its own attention and research. It is easy to lump groundwater into two main categories of quality and quantity. Aside from those two categories intersecting in various ways, each consists of so many issues that to cover it all would be too exhaustive in this paper. I intend to cover the time period from the early 1950s to the first couple of years after the passage of the first comprehensive groundwater quantity law in the state in 2003. This paper is meant to educate the reader on the long, arduous process which groundwater has taken, so that we may understand how difficult it truly was to initiate further discussion on a topic which might arguably be more important now than in previous generations.
Wisconsin was once at the forefront of environmental laws and played a large role in getting the federal government to enact legislation.\(^1\) The role of Wisconsin as a leader in environmental policy is still a source of pride. Upon closer examination however, it appears that Wisconsin has not been perfect in this realm. Wisconsin hasn’t fallen behind other states so much as it has looked past vast amounts of data and research which indicated the fact that groundwater was an issue that needed immediate attention. The reasons for delay and oversight are many and include, but are not limited to: inefficiency of government agencies, a consistent lack of funding for research and compilation, and the overall sense that Wisconsin simply had so much water that it could not possibly run out. Groundwater has been discussed for more than fifty years, but issues relating to groundwater quantity received little attention in laws and reform until late in the twentieth century and into the twenty-first century.

How could a source as invaluable as water be overlooked for so long? It seems like common sense that we would seek to protect and ensure that we would not only have quality water, but enough water with which to live and survive. If water is vital to human existence, how could the state ignore warning signs for so long? Benjamin Franklin was once noted as saying that “when the well’s dry, we know the worth of water.” Wisconsin has been reactive about groundwater at its best and curiously ignorant of pertinent information at other times. Now more than ever water is depended on for a variety of daily uses we take for granted. Increasingly, more and more people around the world are beginning to realize, or have for some time, what life without an adequate supply of clean water is like. If we do not wish to burden ourselves with such predicaments we must protect our essential resources. We also should consider ourselves lucky. Wisconsin is bordered by two of the largest lakes in the world as well as one of the largest

rivers. Not to mention the more than 11,000 lakes dotting the landscape, we have the water resources to survive, thrive, and flourish all around us. Oddly enough, all the water around us in the state is actually a factor in the general neglect of groundwater quantity.

There are essentially two main aspects of groundwater which everything else flows from: quality and quantity. This is not intended to be an oversimplification; at the core of the groundwater discussion lays quality and quantity issues which can branch out and be difficult to define. For most of the twentieth century, groundwater quality has received a vast majority of the attention by citizens and lawmakers, and not without reason. At the federal level the Safe Drinking Water Act and the Clean Water Act were passed in the 1970s to combat the growing problem of water contamination. The Cuyahoga River starting on fire in Cleveland as a result of mass pollution was a large rallying cry for new, protective water laws. Groundwater quantity had no case nearly as visual to match that of a burning river that could launch it into national discourse. Yet, Wisconsin had the foresight to collect data on water-table levels with the help of the United States Geological Survey. While Wisconsin saw groundwater quantity as an issue, the information collected would go relatively unexamined for years.

Despite being a pioneering state in many areas, “Historically in Wisconsin, little research has focused on groundwater quantity problems, issues and management. In the water-rich Midwest, groundwater quality has been considered a much higher priority and has overshadowed groundwater quantity concerns.” This is somewhat paradoxical, due to the fact that extreme withdrawals of groundwater lead to naturally occurring contaminants which affect the quality of the water. Why then, would groundwater quantity continue to be viewed as less important when in the case of over-withdrawal it is directly related to quality issues? A large issue has been how

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to fund research and monitoring for groundwater quantity. Ever since Wisconsin began regulating the construction of wells in the 1930s, money has played a role in what has been done and not done. In fact, at a groundwater management conference in 1991, 75 percent of municipalities and 97 percent of counties felt groundwater was at the least a minor issue.\(^4\) Funding was the number one reason the municipalities and counties cited for action not being taken, with lack of scientific data and research being the second most cited reason.\(^5\) A lack of funding is not the entirely the reason for a delay in action on groundwater quantity. Financial strain goes a long way in helping to explain why such an important topic was overlooked. With the benefit of hindsight, Wisconsin could have handled things differently, but the state has and continues to do a lot to protect its water resources.

**The 1950s and 60s: Groundwater data collection and the seeds of coming issues**

Groundwater quantity has long been overlooked in the history of groundwater in Wisconsin and didn’t become all that apparent as an issue until the 1950s and 1960s, especially in highly populated regions such as the Milwaukee and Green Bay areas. The population boom after World War II is well documented, and Wisconsin had cities that experienced rapid growth much like the rest of the nation. With water in apparent limitless abundance, cities continued pumping more and more water to meet the growing demands of the expanding population. In addition, new technology contributed to the amount of water pumped with increasing efficiency. A book that details the detriment of groundwater pumping by Robert Glennon entitled, *Water Follies: Groundwater Pumping and the Fate of America’s Fresh Waters*, is a great source for

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understanding what effects the over pumping of groundwater has environmentally and economically. Glennon describes the shift in pumping with technological advances:

the groundwater spigot was opened wide in the 1940s and 50s, as high-lift turbine pumps, industrial and automobile engines, center-pivot irrigation systems, gear-driven pump heads, smaller diameter wells and casings, and the availability of natural gas and powerline electricity as energy sources dramatically lowered the costs for installing and operating irrigation systems.6

Indeed, an increase in the use of groundwater was not confined to municipal use. In order to feed a growing population more crops were needed and the advent of the center-pivot irrigation system allowed crops to be grown better and longer with the assurance of enough water.

Industrial use of groundwater has risen exponentially since the introduction of more efficient technologies. According to a Wisconsin DNR report issued in 1997, industrial withdrawals of groundwater increased from 80 million gallons per day in 1950 to 450 million gallons per day in 1995. In addition, the report also stated that agricultural irrigation increased from 5 to 160 million gallons pumped per day. In the same time period agricultural non-irrigation increased from 75 to 100 million gallons per day. In that time period, the population of the state grew by 24%, yet the increase in groundwater pumping exceeded that percentage on every level.7

The first instance of groundwater law came into effect in 1903 as a result of the State Supreme Court case of Huber v. Merkel, in which the ruling stated that a landowner could withdraw and use as much groundwater as desired for any purpose.8 If these practices interfered with a neighbors well, little could be done except for arguments between the adjacent

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8 Huber v Merkel, 117 Wis. 335 (1903)
landowners. This was known as ‘absolute ownership,’ which was quite common at the time. The court ruling would go unchanged for more than seventy years, setting up the state for failure in its lack of recognition of a growing problem. Challenges to the ruling were made, but it stood until water really started to become an issue in the 1970s. In his book, *Protectors of the Land and Water*, Thomas Huffman states that “environmental policy in Wisconsin in the fifteen years after 1945 often remained withdrawn from public oversight, directed by elites from business, conservation organizations, and the state bureaucracy.” Environmental concerns took a back seat to capitalist expansion. If the environment suffered a little as a result of great economic progress than that was the way it had to go. Robert Glennon notes this development in the *Water Follies*, that “at each step in this history, the legal rules changed to favor economic development.” Fortunately this type of thought did not prevail for an extended period of time, as politicians like Gaylord Nelson and Warren Knowles guided Wisconsin towards a more environmentally conscious state.

Slowly, warning signs started to trickle in, Wisconsin was pumping too much groundwater too fast and without being entirely sure what would happen if the pumping habits continued in the same manner. Early calls to pay attention to groundwater actually came from the government; a bizarre twist seeing how they ignored their own reports for so long. William Drescher, an hydraulic engineer for the U.S. Geological Survey worked with a state geologist and issued a report entitled “Ground Water in Wisconsin” in 1956. Drescher begins by saying that “groundwater is becoming increasingly important as a source of supply to meet the demands of an increasing population, a rapid expanding industry, and increasing irrigation … It is

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estimated that by 1975 the use of ground water will have doubled.”\textsuperscript{11} Drescher also details a practice called an aquifer performance test which was quite interesting. According to Drescher, “aquifer performance tests are used to determine interference between wells, the location of nearby hydraulic boundaries, drawdown to be expected in a well at any given rate of pumping, the rate of movement of water, the effect of drainage ditches on the adjacent water table, and the amount of available water held in storage in an aquifer.”\textsuperscript{12} With information like this circulating in 1956, it is somewhat curious that groundwater legislation would remain elusive for so long. It is not as though the state did not take any notice at all. Not long after the publication of Drescher’s report the state commissioned a study which concluded that the water level in the aquifers underlying the Green Bay and Milwaukee areas had dropped by nearly 400 feet since development, which they placed around 1875.\textsuperscript{13} The DNR report from 1997 sheds some light on the development which Drescher addressed by saying “the city of Green Bay pumped large quantities of groundwater until 1957 when it switched to Lake Michigan to supply most of its water needs. Green Bay currently uses groundwater wells only as a supplemental supply to meet summer demands.”\textsuperscript{14} The significant drop in water level has had long-term impacts as well. The same DNR report noted that “originally, groundwater flowed east and discharged into Lake Michigan. Now, Lake Michigan recharges the groundwater.”\textsuperscript{15} This development took place in the 1950s; the city of Green Bay recognized it could no longer rely so heavily on groundwater. Even though there were no laws that would have prevented them from pumping the aquifer dry. When the results of the study were released Green Bay wisely stopped the excessive groundwater pumping habits that had been established in prior years. The knowledge that so

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\item \textsuperscript{11} Drescher, William J., \textit{Ground Water in Wisconsin}, Madison: 1956. 1.
\item \textsuperscript{12} Drescher, William J., \textit{Ground Water in Wisconsin}, 9.
\item \textsuperscript{13} Ibid, 23.
\item \textsuperscript{14} Helmuth, Jeff, et al. editors, “\textit{Status of Groundwater Quantity in Wisconsin},” 11.
\item \textsuperscript{15} Helmuth, Jeff. “\textit{Status of Groundwater Quantity in Wisconsin},” 13.
\end{itemize}
much water had been taken from the underlying aquifer shook the city awake, though it’s not as if pumping limitlessly from Lake Michigan was a permanent solution.

The steep drop in the water table was alarming, and resulted in the high capacity well permit program in 1958. A high capacity well was determined to be a well that pumped more than 100,000 gallons per day.\footnote{Ibid, 31.} Initially, this program was the first of its kind and is demonstrative of the proactive approach Wisconsin took in the 1950s and 60s. Initially it was hailed as a marked achievement and one which many states would adopt and/or model. However, the permit program was riddled with holes and it didn’t take long for it to be nothing more than a propped-up program. A permit was required for any well that pumped more than 100,000 gallons per day; anything below this amount was not subject to a permit or inspection. The cost to monitor high capacity wells led many to go unchecked, often owners of the wells would not even pay the money for a permit, but the state did nothing to reprimand these offenders. Pumping continued to the detriment of groundwater quantity and quality, and the state continued to largely ignore the issue. As a result, once lakes, rivers and streams began to drop in level or dry up the connection to the pumping of groundwater was mostly lost. Most people had yet to realize the pumping effects of groundwater on surface water conditions. The lack of funding once again did more to hinder the development of groundwater laws.

During the 1960s Wisconsin passed several laws that helped it earn the reputation as an environmental leader. The 1965 Wisconsin Wild Rivers Act was the first state law of its kind in the United States, and the Water Resources Act went into effect in 1966. The purpose of the Water Resources Act was “to organize a far-reaching program directed by a single agency for the enhancement of the quality management and protection of waters of the state.”\footnote{Huffman, Thomas R., Protectors of the Land and Water. 85, 122.} The passing of
these two acts displayed the direction Wisconsin wished to take. They were seeking to protect the natural resources of the state as well as its citizens both currently and in the future. Wisconsin was earning a reputation as an environmental leader. Before these two laws were even passed, writing in 1963, Wisconsin’s Interior Secretary Udall observed that, “Many of the concepts originating in recent Wisconsin programs are being incorporated in proposals of other states and in the Congress.” Still, groundwater and more specifically groundwater quantity were not included in these new, ground-breaking laws. It was not yet an area of dire concern, but it was an issue that had a small, yet well-established and sound voice, that was beginning to gain moment and notice. The warning signs were there, in a report entitled Trends in Ground-Water Levels in Wisconsin Through 1966, author Robert W. Devaul of the U.S. Geological Survey noted that “increasing pumpage of ground water by industries and municipalities, and for irrigation, has created concern about declining water levels.” While this may not have been the first instance of calling attention to water quantity issues, it serves as a reminder that just because little was done to protect quantity does not mean it wasn’t being researched and addressed outside of the state legislature. Wisconsin was still among the environmental leaders in cases such as this. “The Wisconsin water-level observation program has a long tradition and is somewhat unique because systematic measurements for a statewide network of observation wells for a long period of time are not common in the United States.” Though the quote was taken from a report from 1996, the statement was just as true in 1966. Wisconsin was doing its part in the realm of data collection and research, but comprehensive groundwater quantity reports and legislation were difficult to procure for a long time.

18 Huffman, Thomas R., Protectors of the Land and Water. 55.
Despite gains in many areas during the 1960s, when the time appeared ripe for new, innovative ways to deal with groundwater issues, environmental policy became more of a political tool than an altruistic act to protect the environment. Gaylord Nelson, for all of his notable achievements which include being instrumental in the founding of Earth Day, may have been partially responsible for this development. Thomas Huffman notes that, “Nelson was both a pragmatist and a liberal idealist who would wield environmental politics as a partisan tool, as a reflection of shifting public opinion, and as a method to encourage policy innovation.”

Furthermore, even with good intentions “Nelson’s challenge to the entrenched conservation establishment in the guise of efficiency, public responsibility, and reorganization, added a theme that both political parties would develop more thoroughly by the end of the decade.” Nelson meant well, and likely had the interest of the state’s environment at heart, but it is a very dangerous game to play. One can begin to understand how the politics of the state hindered the development of groundwater laws. By using the environment as a political tool for campaigning, both political parties sacrificed the good of the state for their own personal gain in order to appeal to voters. “Water resource affairs in Wisconsin entailed competition between Democrats and Republicans, as well as the political and economic impact of the state pulp and paper industry.” The paper manufacturing sector of the state was far and away the largest industrial user of water, accounting for nearly 60% of total industrial use in 1963. Once money and industry became part of the stakes, groundwater began to take somewhat of a backseat. There was plenty of water all around, so it was viewed as either not a problem at all or just a problem for another day.

21 Ibid, 17.
22 Ibid, 30.
23 Ibid, 63.
24 Ibid, 68.
The 1970s and 80s: Groundwater quality overshadows quantity

Throughout the 1970s more research was done in the area of water quality as states and municipalities began searching for answers to the growing problem of providing safe, clean water. Knowledge and understanding of the hydrologic cycle was continuing to expand, and scientists and researchers soon discovered the relation between ground and surface water as well as the connections between quality and quantity. Beginning in 1961, the U.S. Geological Survey began releasing on a state-boundary basis records for stream flow and related data. Water quality records were added to the report beginning in 1965. Groundwater quantity and related data on the other hand were not introduced in the report until the 1975 water year. The water year calendar begins in October and ends in September. In the first report to include groundwater levels, there were tables for 62 of Wisconsin’s 72 counties on a month-by-month period from January of 1972 through December of 1975. Nearly two-thirds of Wisconsin’s counties experienced drops in groundwater levels during this time period. Finally, tangible information was being provided to the citizens of Wisconsin, providing a broader base of knowledge in the growing problem of groundwater quantity. Groundwater may have been the last to join the report, but its importance was recognized. Now it became the state’s responsibility to do something with the information provided in these annual reports.

The inclusion of groundwater in the USGS reports was just part of the growing field of groundwater research. The expanding knowledge of groundwater in the 1970s is also evident in publications such as “Wisconsin’s Ground Water: An Invaluable Resource,” which speaks to the

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need of regulation regarding the water supply and offers words of caution moving forward. The authors note that the fast-growing population is making greater demands upon our water supply. To ensure that the resource lasts we need to learn to understand and protect it. “Shortages can occur almost anywhere unless the usage of ground-water is given careful thought and planning.” I have thus far been unable to establish any connection between the publication of this book and the court ruling in State v. Michels Pipeline, but I doubt it is a sheer coincidence. Despite the fact that this book was published in 1974 and called attention to groundwater quantity, it was almost thirty more years until groundwater quantity became part of state legislation. This long period of inaction resulted despite the fact that this source identified areas of concern and implored Wisconsin to be proactive. For instance, the authors state that “it is clear that in some areas of the state and nation, regulations may be required in the near future to protect groundwater supplies,” they continue with some examples of regulations and practices on crop irrigation, artificial recharge, industrial use, and domestic use. Apparently, the state interpreted the term ‘near-future’ to mean within thirty years of publication.

Yet, despite the calls for conservation and addressing the issue of groundwater quantity, the authors too voiced the general opinion that “Wisconsin’s problem is not one of quantity. Our primary problem is to protect quality.” As encouraged as I was to discover a source from the early 1970s presenting ideas for regulations, and despite discovering through research that quantity was not stressed much in this time period, I was a little surprised to read that rather blunt statement. It seemed to contradict so much of what they were saying in pages prior to that one. They pointed out a need and then nearly refuted that same need. The inside cover of the

29 Stephenson, David A. Wisconsin’s Groundwater, 15.
30 Ibid, 16.
publication even states that “As our fast-growing population makes more and more demands upon our ground-water supply we must learn to understand it and to protect it.” The authors even call for attention to be paid to groundwater supply, and yet it seems by the end they really don’t believe what they stated earlier. It became all about quality, despite the foresightedness in recognizing groundwater quantity as an issue that needed more attention. Herein displays yet again the trouble groundwater quantity had in gaining any type of foothold on the cliff of public consciousness.

While information slowly but surely kept being revealed about the issues of groundwater, the laws regarding groundwater remained unchanged. This has long been an issue, not just forty years ago but into our current century as well. Glennon comments on the lack of progress on groundwater laws throughout the country, “the law in most states has not kept pace with advances in the science of hydrology. As a consequence, the legal rules fail to conform with physical reality.” Part of the problem is that groundwater is not seen, so the effects of over pumping often go unnoticed for years. Glennon elaborates on this view, “With groundwater pumping, we may not notice the changes as they slowly occur over years. Stark consequences – such as rivers that dry up – are apparent.” The impacts of groundwater pumping were seldom looked at for decades, despite the fact that the state was beginning to initiate groundwater legislation and provisions. In the 1997 DNR report it is noted that “The DNR does have a broad authority for protection of the waters of the state. There are, however, no specific provisions in Ch. 281, to consider the potential impacts groundwater withdrawal from high capacity wells may have on private wells or surface waters such as lakes, streams and wetlands.” This seems a little

31 Stephenson, David A. Wisconsin’s Groundwater, inside cover.
32 Glennon, Robert. Water Follies. 29.
33 Glennon, Robert. Water Follies. 10.
counterproductive. Why even have a permit program if the effects of the pumping are not monitored? This of course changed with the passage of the Groundwater Act of 2003, where one of the designations of the bill is to research the area of a proposed well to determine the environmental impact.\(^35\) The Groundwater Act of 2003 will be discussed in greater detail later in the paper. Yet, it took years to come to fruition even though it was identified as a problem with the groundwater program in the state. A concluding point the report also made was that “although groundwater quantity issues have thus far not been a high priority, a continuing increase in water demand suggests they will be of concern in some areas.”\(^36\)

Wisconsin on the surface and based on laws enacted in the 1960s would seem to be at the forefront of groundwater management and legislation, but the groundwater laws demonstrate a level of disconnect with new information that seemed to be calling for action on groundwater. The outdated ruling of *Huber v. Merkel* was finally overturned in the State Supreme Court case of *State of Wisconsin v. Michels Pipeline* in 1974, the first real progress in groundwater law since *Huber v. Merkel* more than seventy years earlier. This case marked the ruling of “reasonable use” relating to groundwater.\(^37\) This meant that a landowner could only withdraw an amount that could be deemed as reasonable. The doctrine of “reasonable use” is prominent in most states east of the Mississippi River. What “reasonable use” meant though was fairly ambiguous, causing a lot of confusion and still allowing less than ethical practices, but the ruling signaled that at the very least the state recognized that changes had to be made. Aside from the ruling of reasonable use, groundwater quantity was yet again pushed to the periphery as discussion on water quality continued to grow. Reports and studies on groundwater contamination started to worry the

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\(^{36}\) Helmuth, Jeff. “*Status of Groundwater Quantity in Wisconsin,*” 39.

people and politicians of the state. More and more, calls for reform and laws protecting water quality were coming forth as many areas outside of Milwaukee and Green Bay began experiencing issues with water quality.

Once the state became more actively involved, the public began to take notice and groundwater became a hot topic of discussion. Anne Bogar-Rieck worked as a science analyst for the state and wrote or compiled several documents pertaining to groundwater. In a background report on groundwater management in Wisconsin released in 1982, Bogar-Rieck explains that “Groundwater management became a controversial public issue in Wisconsin when specific statewide groundwater regulations were recently proposed.”

The two proposals were for a committee to develop specific groundwater protection policies and regulations, and a second proposal relating to mining waste sites. Within the report by Bogar-Rieck is information on quantity, and the story still reads the same as it has since the well-permit program more than twenty years earlier. It has already been noted that Wisconsin participates with the USGS to monitor quality and quantity. Quantity monitoring began with data collection from 209 selected wells, yet Bogar-Rieck details that with all of Wisconsin’s proactiveness:

The groundwater quantity monitoring program operated for years with minimal organization or evaluation of the data collected…a ‘Committee on the Groundwater Observation Network’ established in 1980 to develop design and data collection criteria and continuous data evaluation for the network. Due to funding limitations, collected data has been plotted on graphs and evaluated only for individual projects.

In addition, while comprehensive reports on Wisconsin’s groundwater quality had been published in 1972 and 1981, when Bogar-Rieck compiled this report in 1982, “no comprehensive reports have been prepared on the state’s groundwater quantity.”

Water was quickly becoming the topic of the day, yet there were people who recognized that there was more than one component to groundwater protection.

To combat this growing problem, Wisconsin passed Wisconsin Groundwater Protection Act 410 in 1983. This piece of legislation was dubbed the “Groundwater Quality Act” because it almost exclusively pertained to groundwater quality. The bill was signed into law on May 4, 1984, and was intended to expand “Wisconsin’s legal, organizational, and financial capacity for controlling groundwater pollution.” The law consisted of seven major components moving forward: quality standards, regulatory programs, aquifer classification, monitoring and data management, research, coordination, and local groundwater management. Groundwater quantity was not mentioned in the act. Parts of the act might have a bearing on the issue of quantity, but the failure to include quantity provisions in the act would come back to haunt the state yet again. It is striking how much energy and attention was paid to the problem of groundwater quality when a related component that needed just as much protection did not seem to matter nearly as much. The push for water quality was not confined to just Wisconsin in the 1980s. Beginning with Arizona’s Groundwater Management Code in 1980, the decade saw state’s attention paid to groundwater quality issues expand exponentially.

In fact, a survey of all fifty states found that “all respondents identified groundwater as a threatened resource, and

41 Ibid, 19.
65% of respondents identified it as the most threatened natural resource in their state.” It is little wonder that Wisconsin joined the foray into groundwater during the decade. The Groundwater Protection Act was marked as a hailed achievement and according to the Wisconsin Groundwater Coordinating Council; Chapter 160 of the law which established a comprehensive program for management and protection of groundwater “has been called the most comprehensive regulatory program for groundwater in the country.” In accordance with Chapter 160:

Each regulatory agency must identify substances already detected in the groundwater or substances that have a reasonable probability of entering the groundwater that result from activities the agencies regulate. Groundwater protection standards are established for those substances on a two-tiered basis. For each substance identified, an "enforcement standard' and a "preventive action limit" (PAL) will be set.

Though the law did relatively little for groundwater quantity protection and management, it did create the Groundwater Coordinating Council (GCC) which has been viewed as one of the most significant nonregulatory accomplishments.

The Groundwater Coordinating Council has helped interagency communications, once a major flaw in Wisconsin’s protection of its waters because numerous state agencies had statutory authority for groundwater regulation. These agencies included the DNR, the Wisconsin Geological and Natural History Survey, Department of Industry, Labor & Human Relations, Department of Health & Social Services, State Laboratory of Hygiene, and the Public Service

Prior to the establishment of the GCC, there was little coordination between these agencies. Thus, the GCC was created in Wisconsin Act 410, Chapter 160 to:

Serve as a means of increasing the efficiency and facilitating the effective functioning of State agencies in activities related to groundwater management. The Groundwater Coordinating Council shall advise and assist state agencies in the coordination of nonregulatory programs and the exchange of information related to groundwater, including, but not limited to, agency budgets for groundwater programs, groundwater monitoring, data management, public information and education, laboratory analysis and facilities, research activities and the appropriation and allocation of state funds for research.  

While the delegations to the Council are broad, they all were necessary and had been identified as areas of concern for years. Wisconsin seemed to have a clear understanding of the issues it faced and the GCC was created in response to those concerns. Though the bill and all of its components were celebrated, this was not the end-game, so to speak. Many people still recognized that more work had to be done, but at the very least Wisconsin was addressing problems and was on its way to protecting and preserving one of its most valuable resources.

Shortly after the passage of this bill, Wisconsin Act 60 in 1985 was passed, requiring the development of a water withdrawal registration system. This law expanded upon the high-capacity well permits and in theory was a step in the right direction. With the intent of tracking water use in Wisconsin, it seemed that the state was finally taking a proactive approach in groundwater quantity issues. Data collection from some 5,000 high capacity well owners began

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50 S. 160.50(1), Wis. Stats.
in 1988. However, “because of the costs associated with collecting this data, as well as its limited use and accuracy, the DNR stopped requesting this information in 1994. A water use fee was originally included as part of this initiative but was removed by the Legislature.” Again, funding was the Achilles heel of groundwater, but complacency was not an option for the state which had long been a pioneer in conservation and environmentalism. The GCC’s report to the legislature in 1991 highlighted the fact that just because groundwater had been previously addressed did not mean that no more work had to be done in the area. The report stated that as a political issue we were not done with groundwater, “and for a resource as important to us as groundwater, that is as it should be. Many of the issues that initiated groundwater debates in the late 1970s are with us today in slightly different forms—and they will continue to be issues as long as Wisconsin continues to search for the most effective means to protect our groundwater.” Slowly, Wisconsin was enacting legislation that gave more protection to groundwater and gave state agencies more authority.

**The 1990s and 2000s: Groundwater quantity discussion reaches new levels**

As previously mentioned, Wisconsin has had an observation-well network in place that for years pumped out data that was not utilized to its fullest capacity. The objectives of the network are simple enough, but signal that since this network began in 1946, Wisconsin has had an eye on groundwater. The basic objectives are:

- to systematically study the natural regime of groundwater in various hydrogeologic conditions and to observe changes in the regime caused by human-related factors;

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51 Helmuth, Jeff. “*Status of Groundwater Quantity in Wisconsin,*” 19.
52 Helmuth, Jeff. “*Status of Groundwater Quantity in Wisconsin,*” 19.
to determine groundwater fluctuations and their causes, range, and trends; and
to determine short-term changes and long-term trends in groundwater levels and
to relate these determinations to precipitation and to changes in storage in the
groundwater reservoirs.\textsuperscript{54}

The significance of the observation network has been documented, and the objectives are sound on the surface, but with no laws to protect quantity the network was almost like a façade. As the GCC reported rather bluntly in 1991, “Wisconsin has no comprehensive quantitative management plan for groundwater. We have concentrated all our effort on groundwater quality, but there is little, if anything, being done to protect the amount of groundwater that we use.”\textsuperscript{55}

Groundwater quantity began to be discussed in greater detail throughout the 1990s, with the DNR issuing a report in 1997 on the status of groundwater quantity which has been a major source for this paper. Despite all of the discussion, it was the reaction to a proposed high-capacity well in Adams County by bottling company Perrier that spurred legislation into action.

If not for the well proposal by Perrier, groundwater quantity law might have taken years to come to fruition. However:

Public interest and policymakers’ attention bubbled to the surface in 1999-2000 when a proposed water bottling plant in Adams County showed that state laws didn't address whether nearby springs, wetlands or trout streams might be harmed if the wells were constructed to provide the water. The case served to make people much more aware of the connections between groundwater withdrawal, surface water and human activities.\textsuperscript{56}


The debates raged on for nearly two years before Perrier decided to pull out of the state, and almost immediately, state lawmakers began drafting legislation to protect the groundwater from future cases as just had been dealt with. The result was the Wisconsin Groundwater Protection Act 310, or the “Groundwater Quantity Law.” Act 310 has been labeled as a good first step, but even the authors of the bill realized that “further efforts would be needed to adequately manage groundwater resources in Wisconsin.”

The Groundwater Protection Act of 2003 was enacted in 2004 and became the “first step towards managing groundwater quantity on a comprehensive basis.” The act expanded the state’s authority when considering high capacity wells and their impact on the environment as well as establishing the framework for dealing with water quantity issues in areas of the state experiencing rapid growth. The major components of the Act 310 included the tracking of well construction and use. All high capacity well owners must submit a report on their water use every year. The data will be collected and according to the GCC report, the data will “contribute to a better understanding of groundwater resources throughout the state and improve management of the resource.” In addition to well tracking, the legislation expanded the regulation of high capacity wells for the DNR, called for the designation of two groundwater management areas in the state in Southeastern Wisconsin and the Lower Fox River Valley in the Green Bay area. The intent of this portion of the Act is very important, as it is meant to “encourage a coordinated management strategy among the state, local government units, regional

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planning commissions, and public and private users of groundwater to address problems caused by over-pumping of the deep aquifer, including increased levels of radium, arsenic and salinity."  

Lastly, a component that established a Groundwater Advisory Committee (GAC) was put in place. The GAC was to submit two reports to the legislature regarding the selected groundwater management areas and the effectiveness of Act 310 to be released in 2007. The second report concluded that Act 310 was working as was originally intended. That is, it was a first step in groundwater quantity management. The GAC acknowledged that more work needed to be done but that Act 310 has added a level of protection the state direly needed.

The passage of Act 310 was a long time in the making, but it was not the end-all for groundwater quantity legislation. The state, in-step with its conservationist past, recognized that more needed to be done. It certainly helped that various agencies and committees were first in line to say that the issue of groundwater quantity was not solved by any means. The GCC report highlighted two areas where significant gaps existed. First, “a very high percentage of lakes, streams, small springs, and wetlands are afforded little to no protection under Act 310,” and also that “the adequacy of the 1200 foot buffer provided to trout streams and exceptional and outstanding water resources was not extensively analyzed and a protection scheme based on such an approach may not be sufficient to protect these resources from impacts due to pumping from high capacity wells.” Issues with Act 310 did not end there. The GAC, when compiling its second report spent a lot of time and effort to come up with new ideas for public policy in relation to groundwater in 2007, “but relatively little progress was made as there were deep splits

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61 Ibid, 4.
between water using groups and those who sought stricter pumping controls. Significant issues relating to the impacts of high capacity wells on surface waters remain unaddressed.”

Conclusion

For there to be progress in the realm of groundwater, the laws needed to adapt to the growth of knowledge of hydrology, as well as simply paying attention to reports and studies that indicated beyond question that current practices were damaging the environment and if left unchecked could create major problems for communities or the state as a whole. Yet, as was the case in the 1950s, the concept of economic progress was put ahead of groundwater law. Glennon expands on this notion with a harsh critique:

So it is with groundwater. The doctrines of capture and reasonable use encourage exploitation of a common-pool resource. The legal rules governing groundwater use reward rational economic individuals by assuring them that the biggest pump wins.

Rivers, springs, lakes, wetlands, and estuaries around the country face an uncertain future because most states have separate legal rules for regulating surface water and groundwater.65

Wisconsin had separate legal rules for surface and groundwater until the passage of Wisconsin Act 310, which finally recognized the link between surface water and groundwater66 despite this knowledge being prevalent in hydrological literature years before the Act was passed. Knowing that there is a lot more progress to be made, the GCC notes a need for a more proactive approach

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to regional groundwater planning.\textsuperscript{67} This recognition will only help, as a blanket law for the entire state might not address the needs that specific areas may have. It is important to have regulations in effect, and laws to protect groundwater from unnecessary and/or wreck less damage. The GCC, in hopes of ensuring the preservation of the valuable resource, “will continue to serve as a resource for addressing scientific and technical questions related to groundwater quantity and facilitate further dialogue among all parties on potential approaches and solutions as well as identifying additional areas with developing or potential groundwater quantity problems.”\textsuperscript{68}

Initially, upon discovering just how long groundwater had been discussed in state literature before comprehensive action was taken, I hypothesized that Wisconsin had fallen behind as an environmental leader when compared to other states. However, I found no such evidence. Quite the contrary really, because any mention of Wisconsin’s role in the environment was favorable. Granted, many of the declarations of success came from government publications which may carry some bias, but it seems Wisconsin has kept pace with a handful of states who have been discussing the issue of groundwater and attempting to get out ahead of the issue before it manifests in a way which we likely cannot fathom. Wisconsin has taken many measures to protect and preserve its groundwater through the decades, even if it has not always heeded the information presented such as the initial USGS reports from the 1950s and 60s. Funding for research will likely always be an obstacle, but it is one that must be overcome. The GCC report stresses this fact by stating that, “continued cuts in support will hamper the state’s ability to address critical groundwater monitoring and research needs in the future… Without adequate


\textsuperscript{68} Ibid, 123.
funding for research and monitoring, the best prevention strategies cannot be identified.” To understand how and why the path groundwater quantity legislation has taken is crucial, lest we be condemned to repeat it. We mustn’t become complacent now, the first steps have finally been taken and Wisconsin must reassert its proactive approach in groundwater quantity protection to ensure future generations of Wisconsinites the liberties and privileges we currently have.

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