

## History, Ironies and Observations on Clean Water in America

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Water is vital. It is one of the few things that all people on the planet can agree on. As populations evolved in the United States and economic progress ensued, water resources were challenged. What followed were laws to protect water, but that protection has been limited by the lack of enforcement, lack of education on the part of decision makers, and a general assumption that water is a given in our modern society. All people agree that water is required for life and some might argue a significant force in the shaping of the world as we know it.

One of the early modes of transport, water protected castles from invasions, carried pioneers to new lands, allowed trade among diverse nations, and was a major draw to new settlements as they tended to evolve around water resources. Over time, with improvements in innovations and as populations increased, water took on recreational uses; in the form of pleasure boating, picnic basins, traversing rivers and cruise-ships.

This obvious attraction to water, however, did not guarantee its protection from a clean water standpoint. Throughout time and the evolution of the country, water remains an assumed resource that could be abused, used, traded and recharged. Those rules, however, have been changing and lessons learned in settlements both in America and abroad have caused us to pause in our treatment of the resource and to reconsider how we will address water in the future.

Water was the vital contributor to the settlement of America. And, while there are strong arguments for religious freedom, the pursuit of wood for building and even beavers for trade in Europe, no one would have arrived here without crossing the big pond. Once here, and once basic settlements were established, skirmishes fought and land acquired, the continued navigation of the country was primarily through waterways, a secret the Native Americans already had known for centuries. In those days, there was plenty of water to go around. A study of early maps reveals that water was a crucial link between communities and cultures, and the ever-present commerce. Whether in the market for commodities, for land, or for simple discovery, water was the way to get there.



Delisle's Map of Louisiana, 1718

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<sup>1</sup> Danzer, Gerald A., Chicago's Historic Maps, Resources for Understanding the City, Illinois Historic Preservation Agency, Springfield, 2007

As manifest destiny occurred in the county, and was helped by additional navigational channels like the Erie Canal, there were 4 basic elements that made early settlements possible; tillable land for farming, fresh water for drinking, wood resources for building, and a hearty soul for the unknown challenges of a new frontier. Fresh glacial water was primary and settlements revolved around creeks, rivers and other 'navigable waters'. The issues of disposal of waste, was accomplished through these same waters, which later caused additional problems, but assumptions about the ability of water to cleanse itself was never disputed and the populations were scant enough to provide some truth to these assumptions. .

Water contributed other values as well. In addition to well systems improved over time and eventually plumbing, water became even more of an assumed commodity with little study by grassroots man to the issues of availability. Eventually, water took on recreational value as well as improvements in innovations afforded more time for recreational pursuits. The use of water for entertainment, boating, fishing, skiing, and the like meant that more people were interfering in the surface water resources with a variety of skiff and the potential for pollution exacerbated. Migration followed these trends as well as people surrounded summer resorts, navigated rivers in the traditions of old, and hit the seas for sport. Industrialist created lake-front property on private resorts, and wetlands were converted to farmland across the country. Dams, levy's and clever engineering managed to recreate water systems where none had existed and delete hydric soils where they had existed. All of these pursuits would eventually have an impact on water quality.

Water pollution was significantly more noticeable in communities of greater populations and the lessons to be learned from polluted water took a good deal of time to be learned. Examples of the effects of the pollution were reflected in epidemics around the world like the cholera epidemics in America that began in 1832,

“The impacts of Cholera have reached far beyond the disease. Cholera forced an evolving culture to examine its core. Issues that had been investigated and ignored like clean water for drinking and disposal of sewage were seriously addressed because of cholera. Because of cholera laws were passed, standards assumed, hospitals and health boards were established and eventually cholera was eradicated.

Cholera began to creep across continents like early germ warfare and continued to creep for decades. Beginning in India, and slipping across Europe by 1826, the disease officially traversed the Atlantic in 1832. New York was hit with the disease first in the United States. It began among the poorest in society. This set in motion the idea that it was a disease of poverty and sin. After starting in New York, the disease came to Chicago during the Blackhawk War in the summer of 1832. There was a call for troop support for the threat of Indian hostilities in the Northwest Territory, and renowned General Winfield Scott answered the call by gathering troops in four steamships and heading through the Great Lakes to bring that support. He brought Cholera with him. Cholera forced city leaders to examine potential causes and hence sanitation standards in the city.

They attempted to enforce standards for dumping waste into the streets, the Chicago River and Lake Michigan.”<sup>2</sup>

In 1833 they set in motion a law that read;

“No person or persons shall throw, place or deposit, or cause to be thrown, placed or deposited any dung, carrion, dead animal, offal of other putrid or unwholesome substance, or the contents of any privy upon the margin or banks, or in the waters of Lake Michigan within the limits of said city of Chicago, or upon the margin, banks or into the waters of the Chicago River or either of its branches...under penalty of five dollars for each and every day the same shall be allowed to remain after a conviction for the same offense.”<sup>3</sup>

The law helped educate the populace and cholera disappeared for a while, but in 1848,

“The next major hit began its journey from India in 1846. As it crept around the world, Chicago had warnings because the city now had three newspapers that reported its progress. The news accounts provided both true and false information. Even with the knowledge that cholera was on its way little had been done by the community leaders to prepare for the next major epidemic.

German ships landed in New Orleans in 1848 bringing cholera with them. It is estimated that in New Orleans alone, 4,000 people died. In the south, over 10,000 slaves died. When the ship, the *John Drew*, arrived in Chicago from New Orleans, by way of the Mississippi on April 29, 1848, it brought the cholera. This time the disease lasted through 1854. The final toll on the city’s population was difficult to gauge because of poor record-keeping, but it was estimated that 5% succumbed. One of the first examples of improvements was the formation of the Chicago City Hydraulic Company who investigated creating a city-wide water system in 1851. Eventually, the city council voted for an underground sewer system with drains from each home. The recommendation was to raise the city so that underground storm sewers could assist in carrying away offal during rain events. The idea was the first of its kind in the country though it would take nearly 2 decades to complete.”<sup>4</sup>

The ideas began to take root, but once again after cholera dissipated, many of the laws were abandoned. The last epidemic changed all of that,

“By 1865 city leaders recommended 8 actions to avoid the results of the last epidemic. The recommendations included: street sewers, garbage disposal, river clean-ups, manufacturing disposal standards, street cleaning, housing standards, public restrooms and the issuance of certified death certificates. With the recommendations came the foreshadowing that failure to implement the measures would result in calamity. Politics and money stalled the response to those recommendations and in 1866 their prediction came true when Cholera once again reared its ugly head. Once public health reform was implemented, Cholera

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<sup>2</sup> Schumm, The Impact of Cholera Epidemics on Life in Chicago, Illinois Historic Preservation Agency annual History Conference, paper 2006

<sup>3</sup> Hill, Libby. *The Chicago River*, page 102

<sup>4</sup> Ibid. Schumm

was eradicated in Chicago. Reforms included the following; Cook County Hospital was permanently built, a comprehensive sewer system that included the construction of a sanitary shipping canal to carry away sewage was begun, a city-wide water cleansing and distribution system was built, and the flow of the Chicago River was reversed to keep sewage out of the lake particularly during floods. The Chicago Fire of 1871 allowed for new re-design of the city that included an improved sewage removal system where old buildings had been located.”<sup>5</sup>

The irony was that tragic issues that spanned nearly 40 years finally forced communities to take actions to protect the water supply. These were decisions left in the hands of the local decision makers who allowed politics, stubbornness, and economics to slow progress and result in serious consequences.

There were other ramifications to the changes implemented with Cholera. The reversal of the Chicago River had an effect on Lake Michigan as it diverted water from Lake Michigan down the Sanitary canal and then ultimately to the Mississippi. Wisconsin, a neighbor to the north and on the shores of Lake Michigan filed a law suit in the United States Supreme Court challenging the action. The River remained reversed, but the question of water usage, began to stir around the great lakes, recognized as one of the largest fresh water boundaries in the world! And the world was taking notice. In 1909 the first International boundary Waters Treaty was signed between Great Britain (for Canada) and the United States. This agreement was to assist in the arbitrations of disputes having to do with diversions and projects that affected the water level and flow of the boundary waters.

Around the rest of the country, other water issues were surfacing as no one was immune to the issues of water pollution, or water management. There were laws established in early days to manage these systems as migration moved towards the west. One of the early federal drainage laws was the Swamplands Act of 1850:

“A U.S. federal law, the **Swamplands Act of 1850** essentially provided a mechanism for transferring title to federally owned swampland to private parties agreeing to drain the land and turn it to productive, presumably agricultural, use.<sup>[1]</sup> Primarily aimed at the development of Florida's Everglades, and transferring some 20 million acres (31,000 sq mi; 81,000 km<sup>2</sup>) of land in the Everglades to the State of Florida<sup>[2]</sup> for this purpose, the law also had application outside Florida, and spurred drainage and development in many areas of the United States, including areas around Indiana's Kankakee River,<sup>[3]</sup> Michigan's Lake St. Clair's shores, and elsewhere, and encouraged settlement by immigrants arriving in the United States after that time. Later considered to have been ecologically problematic, many of its provisions were in time reversed by the Wetland Protection Act of 1972<sup>[4]</sup> and later legislation, but its historical effects on U.S. development and settlement patterns remained”.<sup>6</sup>

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<sup>5</sup> Ibid. Schumm

<sup>6</sup> 1. Anchor Bay Watershed Management Plan

Prior to the act, swamplands remained in federal ownership. Post law, the Act served to create an industry that laid millions of miles of drain-tile throughout some of the richest loam in the world. Its ultimate effect was to create farmland where woodland and wetland had been, and to eradicate the vital sponges of land that would promote recharge of aquifers and replace the prairie soils that had distinguished the Midwestern grasslands of America. It took time as the dry lands were plowed first, but eventually,

“ The wet prairies were among the last to go, wrung out by long lines of clay tiles and bull ditches that hastened runoff and dropped the water table, drying the land for the plow. Permanent sloughs and prairie lakes were ditched into the prairie streams, which in turn, were plowed to their banks and straightened and canalized to hasten the demise of the native waters.”<sup>7</sup>

After the swamplands act of 1850 and because the country was advancing west as land became available, issues with water tended to relate directly to individual circumstances. This is where commerce began to rule water practices. In fact, commerce, in general began to make its own rules as far as water was concerned. Sanitary/shipping canals were popular substitutions for diversion channels and helped to convey waste as well as providing shipping links to and from major waterways, eventually connecting more water routes across the country and bringing supplies from industries to those same lands. As expansion to the west continued, problems with water access became more challenging as the terrain changed.

Problems were occurring throughout the country that required some attention and planning. In Colorado, the first watershed plan was considered as a result of the recognition that water supply in Colorado was limited from the start and that planning would be required to guarantee its availability for future generations. John Wesley Powell, soldier, explorer, geologist and the first American to take part in the Geographic Expedition of the west in 1869 recognized the importance of this strategy to protect the western states in the late 1880's. Eventually, the construction of the Hoover Dam in 1931 would have long term impacts downstream and upstream on the River System in Colorado, though it was responsible for providing hydro-electric power to the region. The question of water access and water rights out west are still being hotly debated today on many levels and the creation of dams and water manipulation in general became a right and later a hotly disputed issue as populations increased, water supply decreased and habitat quality decreased or disappeared.

Between 1910 and 1950 the issues of water usage for hydropower and commercial navigation were impacting diversions out west and around the great lakes. Armament manufacturing during World War II required 3.6 billion gallons per day to be diverted from the Long Lac and Ogoki watersheds into Lake Superior. After WWII, the need for water control boards became

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2. Terpin, John, Global Climate Change Affecting the Florida Everglades: Anthropogenic Causes for Disaster in the South Florida Ecosystem

3. Roselawn, Indiana - Back in Time A Glance at History

4. PlanetPapers - Wetland Research Paper

<sup>7</sup> Madsen, John, Where the Sky Began, Iowa State University Press, 1982.

necessary for St. Mary's River, Niagara River and Lake Ontario-St. Lawrence River so that outflow control plans and water levels could be managed for hydropower and navigational needs.

Power and navigation were not the only issues at stake in the country in the early 1900's. The industrial revolutions that snaked across the United States brought with them a quest for recreational spaces for affluent Americans and farmers seeking to control water resources for recreational and farming uses. The surge in privately dammed creeks and man-made water-bodies was epidemic across the nation. Civil Law Rule which dated back to early English, Spanish and French laws allowed that a landowner had a right to manage water drainage on their own land. The law allowed that owners of higher land had a right to allow water to be managed and drain off naturally to those on lower land and those on the lower land cannot obstruct it. These mandates were managed locally and/or on a state level. The recreational uses in privately owned hunting clubs were less complicated where investors owned hundreds of acres of land and created large water bodies to access for sport.

As Americans expanded across the country, the trend was and continued to be, to engineer the world to the needs of man rather than to modify man to the natural world. Engineering is defined as, "the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people."<sup>8</sup> The effects of these applications would eventually cause repercussions.

As demand for water increased and quality of the supply became obviously questionable, regulations were needed to manage resources. The first federal Clean Water Act was developed in 1948, called the Federal Water Pollution Control Act. It stated:

"Before 1948 various minor laws dealt with aspects of water pollution. The only notable one was the Refuse Act, actually a section of the Rivers and Harbors Appropriations Act of 1899. The Refuse Act was not aimed at preventing water pollution but rather at preventing the dumping of materials that might impede navigation. In the five decades following the Refuse Act, waterways continued to be used as a convenient place to dispose of waste. Indeed, waste disposal was seen as a legitimate use of these waters. As a result, substantially more pollutants were being discharged into the nation's waters at a greater rate than the waters could absorb. In the years just prior to World War II, states and municipalities took some steps to deal with water pollution, but the pressure of war production essentially put those efforts on hold. In the postwar period, attention again turned to the country's polluted waters. It was reported in 1945 that over 3,500 communities pumped 2.5 billion tons of raw sewage into streams, lakes, and coastal waters every day. The Surgeon General warned that, as a consequence, over half of the U.S. population relied on drinking water supplies of doubtful purity. In a report that eventually accompanied the 1948 legislation, the Senate Committee on Public Works declared that "pollution of our water resources by domestic and industrial wastes has become an increasingly serious problem due to the rapid growth of our cities and industries.... Polluted waters

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<sup>8</sup> Merriman-Webster dictionary

menace the public health (through contamination of water and food supplies), destroy fish and game life, and rob us of other benefits of our natural resources" (House Report no. 1829, to accompany Senate Bill 418, 80th Congress, 2d session, April 28, 1948).<sup>9</sup>

There were other mitigating factors that affected the implementation of further laws. In 1969, the Cuyahoga River in Cleveland, Ohio caught on fire from pollution and set off a public relations debacle that is still felt today around the world.

“On June 22, 1969, oil and debris on the surface of the Cuyahoga River in Cleveland, Ohio, burst into flames and burned for twenty-five minutes. The burning river quickly became national news. *Time* magazine published an article headlined “The Price of Optimism,” complete with a spectacular photo of the river aflame. Randy Newman wrote a song about the famous fire. And decades later, environmental leaders remembered the fire as an emblematic cause of the burgeoning environmental movement. “I will never forget a photograph of flames, fire, shooting right out of the water in downtown Cleveland,” President Clinton’s EPA administrator Carol Browner said years later. “It was the summer of 1969 and the Cuyahoga River was burning.”<sup>10</sup>

This was not the first fire that had occurred on the Cuyahoga River, others began as early as 1868, with the most damages occurring in 1952.<sup>11</sup> Cleveland, while perhaps the most notorious polluter, was certainly not the only one. What the publicity managed to do was inspire the most aggressive plans to do something about pollution on a federal level and consequently the Clean Water Act of 1972 was created targeting specifically industrial users first.

This first draft of the Clean Water Act allowed;

“The 1972 amendments to the Federal Water Pollution Control Act (known as the Clean Water Act or CWA) provide the statutory basis for the NPDES permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the United States. Section 402 of the CWA specifically required EPA to develop and implement the NPDES program. The CWA gives EPA the authority to set effluent limits on an industry-wide (technology-based) basis and on a water-quality basis that ensure protection of the receiving water. The CWA requires anyone who wants to discharge pollutants to first obtain an NPDES permit, or else that discharge will be considered illegal. The CWA allowed EPA to authorize the NPDES Permit Program to state governments, enabling states to perform many of the permitting, administrative, and

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<sup>9</sup> Barry, Frank J. "The Evolution of the Enforcement Provisions of the Federal Water Pollution Control Act: A Study of the Difficulty in Developing Effective Legislation." 68 *Michigan Law Review* 1103 (1969–70).

<sup>10</sup> Nordhaus, Ted and Schellenberger, Michael, *Break Through: From the Death of Environmentalism to the Politics of Possibility*, (Houghton Mifflin, 2007)

<sup>11</sup> Source; [www.clevelandmemory.org](http://www.clevelandmemory.org)

enforcement aspects of the NPDES Program. In states that have been authorized to implement CWA programs, EPA still retains oversight responsibilities.”<sup>12</sup>

The establishment of the Clean Water Act was recognized as the start of cleaning up waters for the wide range of uses of the day, namely; potable use, recreation, hydropower, commerce and navigation. With this initial creation of an official act directed toward pollution elimination, a turn towards water quality began in the country. This turn was not only among officials, but also the general population as people began to consider where they were recreating, where their water came from and where they were willing to stick their toes.

There were many iterations of the Clean Water Act to follow and each included additional protection for additional resources:

“The 1977 amendments:

- Established the basic structure for regulating pollutants discharges into the waters of the United States.
- Gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry.
- Maintained existing requirements to set water quality standards for all contaminants in surface waters.
- Made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions.
- Funded the construction of sewage treatment plants under the construction grants program.
- Recognized the need for planning to address the critical problems posed by nonpoint source pollution.

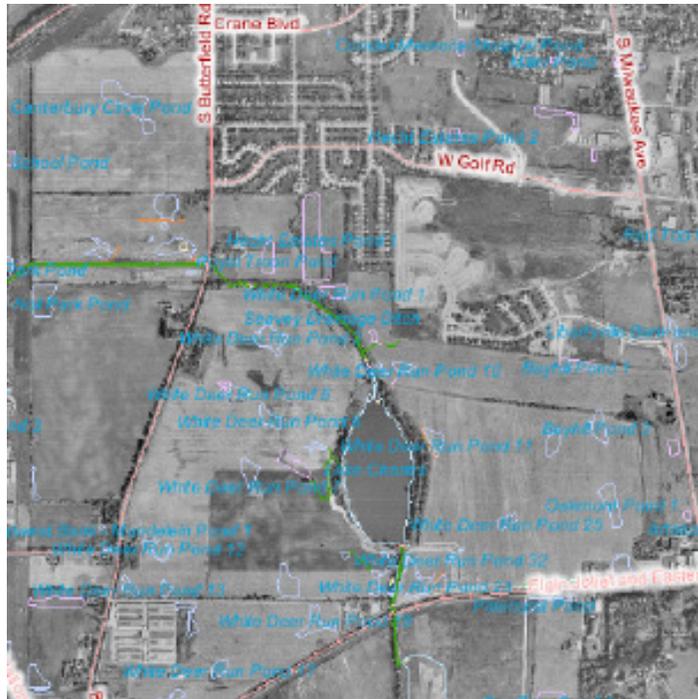
Subsequent amendments modified some of the earlier CWA provisions. Revisions in 1981 streamlined the municipal construction grants process, improving the capabilities of treatment plants built under the program. Changes in 1987 phased out the construction grants program, replacing it with the State Water Pollution Control Revolving Fund, more commonly known as the Clean Water State Revolving Fund. This new funding strategy addressed water quality needs by building on EPA-state partnerships.

Over the years, many other laws have changed parts of the Clean Water Act. Title I of the Great Lakes Critical Programs Act of 1990, for example, put into place parts of the Great Lakes Water Quality Agreement of 1978, signed by the U.S. and Canada, where the two nations agreed to reduce certain toxic pollutants in the Great Lakes. That law required EPA to establish water quality criteria for the Great Lakes addressing 29 toxic pollutants with maximum levels that are

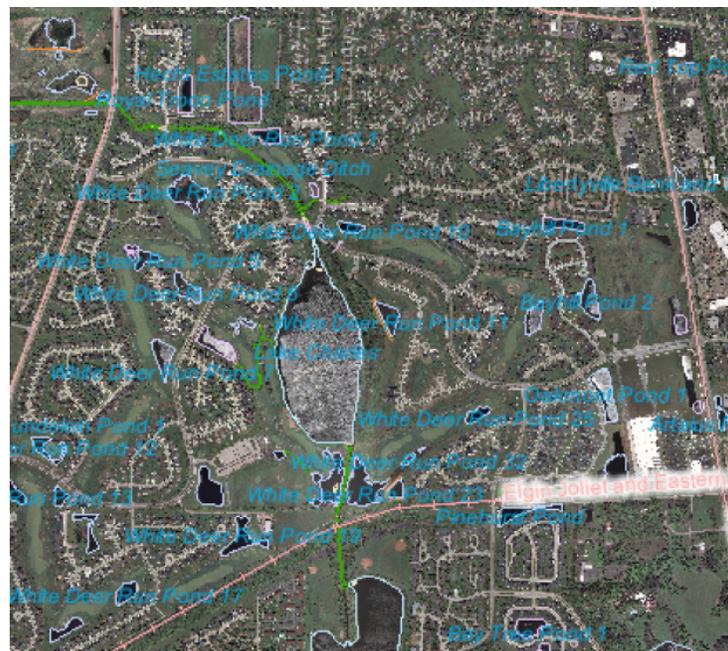
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<sup>12</sup> USEPA, NPDES system





Then by 2010, after 2 decades of extremely heavy suburban expansion farms were virtually eradicated and Municipal storm sewers, detention basins and diversion channels took on formerly urban volumes of water.<sup>16</sup>



With this volume of people, came added pressures on water supply, pressures on water quality, stormwater flooding issues and renewed concerns about sanitation. Other problems followed as communities recognized the impact that unprotected construction was having on water

<sup>16</sup> Map source, <http://gis2.co.lake.il.us/maps/>

resources in the form of increased sediment loads. This was happening all across the country where development and urban sprawl was occurring.

Recognizing that there may be an impact to the loss of farms and wetland, the federal government established the first wetland mitigation banks around 1983 in partnership with US Fish and Wildlife Service. Other programs were commenced with US Soil and Water Conservation Services who began programs with farmers to reduce the impact of farming on waters of the US as well.

Mitigation practices were vital as parts of the country that depended upon recreational water quality, in particular, were in triage stage with contaminated surface water resources. The problems were magnified as global issues also surfaced; namely climate change, the disappearance of the Aral Sea, and contamination issues of waterways across the country that created food supply issues.

Evidence of the recognition of triage came when an unprecedented agreement, nearly 150 years in the forming, was signed called the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement, and the Great Lakes – St. Lawrence River Basin Water Resources Compact in 2005. Other regulations followed, communities began to take responsibility and local champions for clean water stepped up to assist in efforts. The EPA encouraged this with the Section 319- Non-point source pollution grants and a movement across the country to mitigate for loss of wetlands began to take root. Natural areas began to be restored, wetlands were mitigated and watershed groups began to be established around the country.

With all this regulation and concern we now have clean water, right? Not exactly. In fact, the effects of all of the last centuries abuses are having their toll. Fisheries are experiencing a decline from the oceans to inland waterways. Indicator species like macro-invertebrates are vanishing. And, the invasion of exotic species from worms to plants are becoming overwhelming to manage. It is evident that years of neglect will take many more for recovery. In other words, we are beyond triage. We are at code red! But, how do we let the decision makers and regular people know this? Therein remains one of the greatest challenges. In a time when the media consumes us, and we are distracted by celebrity silliness, we do not realize that our water supply and quality is at a critical juncture. Until water protection becomes as natural to us as brushing our teeth, we will continue the downward spiral.

## **The Ironies**

There are a few ironies that jump out when reviewing the history of water use and abuse in America. The responsibility of water protection has been relegated to leaders, rather than to individual users though these users have the ability to encourage and demand protection as they are impacted directly by water quality. The decision makers, historically and currently rely upon the expertise of their advisors or their own decision making capabilities, albeit with no formal education on water supply. The engineers who act as advisors to those same leaders are dependent upon information that they receive on current trends, or known responses to

problems and a pressure to provide solutions that the community will support. As a result, politics is still a major player in water quality, as it was during the cholera epidemics of the 19<sup>th</sup> century.

Enforcement of regulations is always the problem as well. Even though the clean water act has been in place for well over 35 years, there are still violations occurring on a daily basis around the country from small isolated contaminations from individual landowners to large scale violations from highway construction projects and industrial errors. The burden of violations has been that, water, like any life force abused over time, no longer recovers as quickly as it did when there were only a few violations. The sediments that have choked out the macro-invertebrates have also wiped out the bottom-feeders that helped to clean up contaminants and it goes up the food chain.

Farmers still operate under different rules than the rest of the country. This is a statement of fact. We still rely upon those farmers for our food sources and protection of farmland from development or for wetland restoration purposes is a lofty and important goal in conservation. But, encouraging efficient use of nutrients, protection of water systems adjacent to farms and isolation of large feed operations is an important strategy to maintain pollution reduction standards.

Homeowners also invest fortunes to support an industry of turf grass maintenance between landscape teams, chemicals that remove weeds, and time investments. Natural area management, in the long term, would require less maintenance, but requires a new way of looking at the landscape. If the vision of a prairie inspired health, rather than weedy recklessness, perhaps this would be an easier sell to modern man.

Perhaps every generation has believed themselves more evolved than the last. As we look at the history of water quality in America we have to conclude that, while some improvements have been made in that we no longer drink wastewater, we still take water for granted. WE still assume that the water we have is a never ending supply and we still contaminate it on a daily basis by our daily practices. We are contributing now to the problems of water quality that our grandchildren will face, if we do not change our ways.

The weakest link in all of this is still a disconnect between the laws and the decision making ability of the individuals who make up our country. Ultimately they are the ones who will allow abuse at the grassroots level, slow progress and protection, and ironically suffer the greatest losses when water supply dwindles, and water quality forces people from their communities. The unspoken elephant in this discussion is groundwater and its supply and long-term availability that will be impacted by the choices that are made on surface land and water treatment at the local level. Every decision made against water quality will pay a price down the road.

The greatest irony is that we all recognize that water is vital to quality of life, but we still struggle with water protection from individual usage to federal protection. While we know the right things to do, we still do not implement those strategies. Clean water is incumbent upon all people working to protect, and enhance this limited and vital resource. The Clean Water Act is

based upon the basic principal that pollution takes many forms and protection is the responsibility of everyone who utilizes the resources. The question is; do we have the luxury of another generation to waste until we all recognize this?