Pittsburgh Wastewater Issues: The Historical Origins of an Environmental Problem

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Abstract

The Pittsburgh region has a rich resource in its substantial rivers and ample water supply. In the past these rivers were regarded as an extension of the municipal and industrial infrastructure and as sinks for wastes. Today, however, because of a series of both planned and unplanned actions, river quality as indicated by water quality indicators and fish specie counts is probably better than it has been in over a hundred years. The region, however, still faces a number of serious problems in regard to pollution from combined sewer overflows, leaking sewers, non-point storm water runoff, malfunctioning septic tanks, and acid mine drainage. These problems are primarily a result of infrastructure-related decisions made in the past through various stages of urbanization. This paper will describe present conditions and focus on the contribution of past decisions relating to infrastructure and waste disposal to the contemporary situation.

Introduction

The Pittsburgh region has a rich natural resource in its neighbouring rivers: the Allegheny, flowing 325 miles in a southwest direction from its headwaters in north central Pennsylvania; the Monongahela, flowing 128 miles northward from its headwaters in the West Virginia mountains; and the Ohio, formed by the confluence of these two streams at the Pittsburgh Point and flowing westward for 981 miles to the Mississippi River. The Point and these three rivers – the Allegheny, Monongahela, and the Ohio - provide the physical framework around which settlement of the Pittsburgh region has unfolded. In addition, there are also three secondary rivers—the Beaver, Kiskiminetas, and Youghiogheny—as well as dozens of tributary streams, creeks, or runs that complete this riverine landscape (Harper 1997).

The rivers have been crucial throughout history in the development of Pittsburgh and its region and have shaped patterns of settlement, the built landscape, and the regional economy. Pittsburghers have also configured the rivers, altering their flow, water composition, and caused major changes in riverine ecology (Muller 2003). All cities have to deal with the problem of their metabolism - providing a supply of fresh water for domestic and commercial/industrial purposes, for street cleaning, and for fire-fighting - and then disposing of this water in a manner that will not endanger the health of their citizens or the surrounding ecosystem (Tarr 2002). Because of its position as a riverine city, Pittsburgh has been blessed by abundant supplies but also cursed by the extensive pollution of these supplies resulting from their use as sinks for waste disposal. For over a century Pittsburghers treated the rivers as part of the industrial and municipal infrastructure, resulting in massive degradation of stream quality.

Today, after decades of agitation by various stakeholders for cleaner water and by subsequent governmental efforts, river quality is higher than it has been in over a century as measured by increases in fish species and water quality indicators (Anderson et al. 2000; Pearson & Pearson, 1989). Ironically, the collapse of the region's steel industry, which devastated the local economy, also made a substantial contribution to improving water quality by sharply diminishing the amount of industrial wastes entering the rivers. Public authorities and elites now regard the rivers as important not only because they provide industrial and municipal infrastructure but also because they provide environmental and ecological resources (Muller, 2003).

Like other older industrial regions in the United States and Europe, however, the Pittsburgh region is still beset by a number of serious water pollution problems. This pollution stems primarily from combined sewer and separate sewer overflows, groundwater pollution from septic tanks, raw sewage discharges in rural areas, and acid mine drainage from old coal mines. The Pennsylvania Department of Environmental Protection has identified acid mine drainage, for instance, as the state's single most serious water pollution problem.

This paper will focus primarily on those water pollution issues that stem from the existing infrastructure, primarily combined sewers, separate sewers, and septic tanks, since acid mine drainage raises a different set of issues. While other cities and regions also have problems similar to Pittsburgh, those in western Pennsylvania are among the most severe in the United States.

Understanding why this pollution problem exists requires examining past decision-making in regard to water supply and wastewater disposal. These decisions were not inevitable but were rather based on a combination of economic, technology, environmental and value-related factors. Some of these decisions revolved around the existence of an underground and fixed technology, creating conditions of "path dependency."

Essentially, there have been seven major critical and related decisions made during the course of this history. These are:

1. The decision to draw the city's water supply from the neighbouring rivers, especially the Allegheny River.
2. The decision to build the water carriage systems of Pittsburgh and neighbouring cities following a combined rather than a separate sewer system design.
3. The decision to use the rivers as the place of disposal because of the belief that running water purified itself, later replaced by the concept of dilution.
4. The decision to filter the drinking water in order to deal with concerns over issues of public health rather than go to a protected upcountry source.
5. The decision to continue to use the rivers as a place of disposal for untreated sewage and to resist state efforts to force the city to treat its sewage and change its sewerage system from a combined to a separate system.
6. The post WW II decision to treat finally the sewage of Pittsburgh and neighbouring communities by creating a county Authority with a centralized treatment plant - the Allegheny County Sanitary Authority – with authority to intercept and treat sewage from the municipalities but not to control their collection and storm water systems.

7. The decision in the post-World War II years to deal with wastewater in fast growing suburbs through septic tanks or separate sewer systems that only provided for domestic wastes and not for storm water.

Each one of these decision areas included issues of technological choice; of public health concerns related to "risk-based" decisions; to issues of costs; and to matters concerning the political and institutional contexts within which the decisions were made. Each also reflected decisions made on the basis of imperfect information ("satisfysing") and a failure to anticipate negative impacts. These decisions were not inevitable but to take other directions carried heavy financial costs. These decisions and their consequences will be explored in the following text.

Water Supply

For its first quarter century of existence, Pittsburgh citizens drew their water supplies primarily from local ponds and wells. However, these sources became increasingly inadequate to meet domestic, industrial, fire protection, and public health needs. In 1826, after extensive debate over the issue of public or private ownership, the Pittsburgh Select and Common Councils approved the construction of a municipal waterworks. The waterworks utilized a steam pump to draw water from the Allegheny River for gravity distribution throughout the city (Tarr, 1989). Throughout the 19th Century, the waterworks expanded in response to population and territorial growth. By 1915, the system had 743 miles of distribution pipes (Lanpher and Drake, 1930). Because of extensive waste and leaky pipes, the city had one of the highest rates of per capita water consumption of any city in the nation (Tarr and Yosie, 2003).

Waterworks funding was a major municipal expenditure. Pittsburgh's willingness to accept such large costs for a public good can be explained by the joining of a variety of interest groups - including merchants and industrialists, homeowners, fire insurance companies, and physicians and sanitarians - to demand an adequate supply of water. Notably, these investments occurred during a period of prosperity when many of the City's great buildings and other facilities were being constructed.

Sewerage System

A supply of potable water was only one part of the city's metabolic system - wastewaters from households and industries and stormwater also required disposal. During most of the 19th Century Pittsburghers placed household wastes and wastewater in nearby cesspools and privy vaults with underground containers, not in sewers. The 1804 borough charter gave the city the right to regulate such receptacles but the city councils did not enact an ordinance until 1816, when citizen complaints about overflowing filth and smells from privy vaults caused the councils to approve fines in the case of nuisances. Privies and garbage still fouled the streets and polluted the rivers with wastes, despite the relatively ineffective cleaning efforts of private scavengers under city contract. In 1875, the Pittsburgh Board of Health observed that privy vault nuisances were the major health issue facing the city (Tarr, 1989).

The provision of running water to households and the adoption of water-using appliances such as sinks, showers, and water closets, exacerbated the problem of overflowing cesspools and privies. On the one hand, improving the availability and volume of water supply was a benefit, but on the other hand it had the potential of delivering contaminated water with resulting impacts on public health. In many cases, in order to dispose of the wastewater, households connected these appliances to the existing wastewater disposal sinks - cesspools and privies. In 1881, for instance, about 4,000 of the 6,500 Pittsburgh water closets were connected to privy vaults and cesspools but only about 1,500 to street sewers (Yosie, 1981).

Such conditions raised the possibility of infectious disease outbreaks and highlighted the need for improved sanitation and construction of a sewer system. The city first constructed underground sewers in the commercial district, mainly to prevent flooding by draining urban runoff (Thompson, 1948). Other areas of the city, however, possessed uneven and haphazard service. While by 1875 the city had built about 25 miles of sewers (primarily brick and mostly for stormwater drainage, these sewers suffered from design faults and were often either undersized or oversized and subject to constant clogging. Sewers did not conform to topography (the city lacked topographical maps until the 1870s) or follow an overall engineering plan since the city commonly built sewers in response to council members' attempts to meet specific constituent demands. Many households constructed their own sewers, which were often unrecorded and not reliable (Tarr, 1989).

Engineers and physicians vigorously debated the design of the new centralized sewer system - should it be a separate, small pipe system that carried only domestic and industrial wastes or a larger, combined system that accommodated both wastewater and storm water in one pipe, a design favoured by many sanitary engineers? Physicians argued for the separate system on the grounds that it would protect health by removing wastes from households before they had begun to generate disease causing sewer gas. They considered storm water a secondary matter, best handled by surface conduits. Engineers on the other hand, maintained that sanitary wastes and storm water were equally important and that a large pipe system that would accommodate both was more economical. Years of debate convinced city officials of the greater cost effectiveness of the combined system, and by the late 1880s Pittsburgh had begun to build a system of large combined sewers (Tarr and Yosie, 2003).

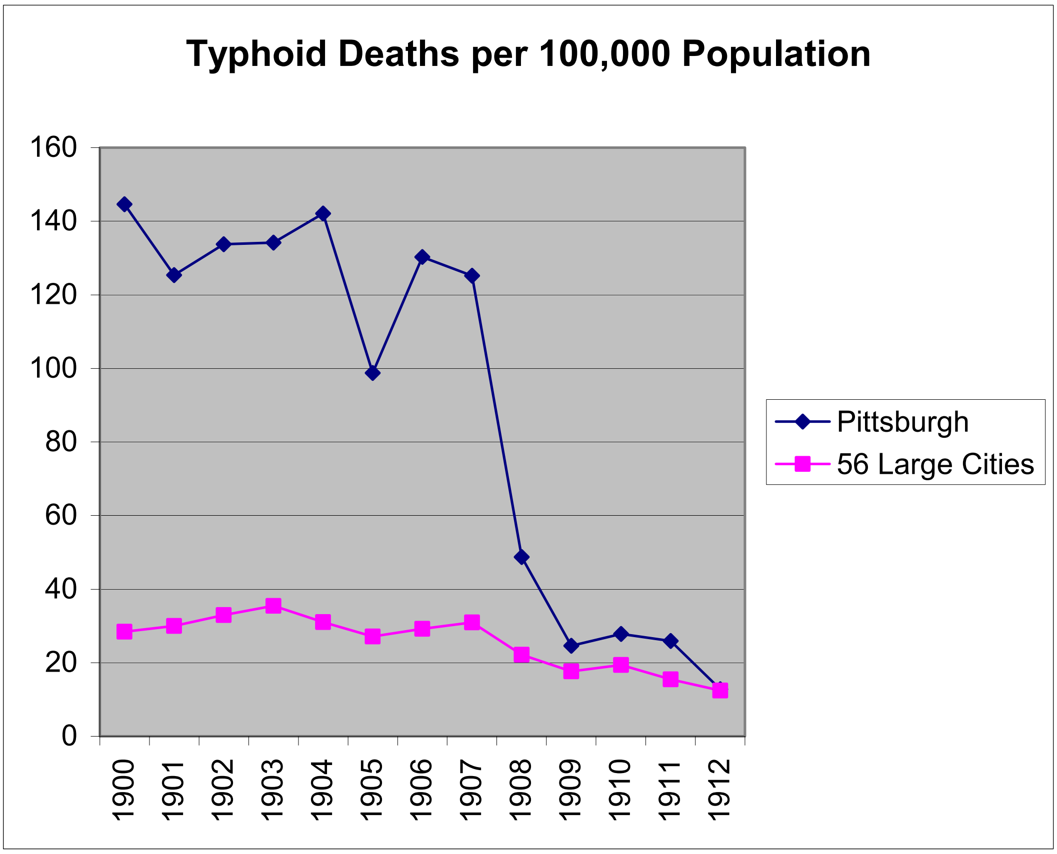
Between 1889 and 1912, civil engineers from the new Bureau of Engineering of the Public Works Department constructed over 412 miles of sewers, almost all of the combined type. The construction of the planned centralized sewerage system signified a movement away from the "piecemeal, decentralized approach to city building characteristic of the 19th century" (Peterson, 1979). In constructing a large centralized combined sewer network, Pittsburgh was following the lead of other large American cities such as Boston, Chicago, and New York, as well as European cities. Like other cities, Pittsburgh discharged its untreated sewage directly into neighbouring waterways, with 47 public sewer outlets into the Monongahela River, and another 98 into the Allegheny and Ohio Rivers (Tarr and Yosie, 2003). Fluctuations in the size of rainstorms required the system to have many outlets to avoid overloading.

Typhoid Fever and Water Filtration

While Pittsburgh was discharging its untreated sewage into its neighbouring rivers, upstream communities were also building sewers and discharging their wastes into the same streams. By 1900, more than 350,000 inhabitants in 75 upstream municipalities were discharging their untreated sewage into the Allegheny River—the river that provided drinking water for most of Pittsburgh's population. Some of Pittsburgh's own sewers discharged into the river at locations above the city's water supply system intakes. The resulting pollution, combined with primitive sanitary conditions in immigrant and working class areas, gave Pittsburgh the highest death rate from typhoid fever of the nation's large cities, over 100 deaths per 100,000 people from 1873 to 1907. In contrast, in 1905, the average death rate for northern cities was 35 per 100,000 persons (Koppes and Norris, 1985).

Concerned over the growing typhoid mortality, two commissions were created in the 1890s, first an unofficial commission composed of public-spirited citizens (with a prominent representation of women) and professionals; and second, an official city commission that hired as consultants three of the nation's leading sanitary engineers. The commissions used chemical, bacteriological, and statistical methods to explore the issue of water pollution, and both came up with essentially the same conclusion: Pittsburgh's water supply was "not only not up to a proper standard of potable water but…actually pernicious" (Tarr and Yosie, 2003).

The major options the experts considered to solve the problem of a polluted water supply was either to draw the city's water from a protected upcountry watershed or to continue to obtain it from the Allegheny River, filtering it before public distribution. Because of reasons involving primarily the expense of transmission, in 1899 the municipal commission recommended that the city construct a slow sand filtration plant drawing water from the Allegheny River. Pittsburgh thus joined cities such as Philadelphia, Cincinnati, and Cleveland that took their water from neighbouring rivers and filtered it. Other, cities such as Boston, Newark, and New York, chose the option of relying upon a protected upcountry watershed for their supplies. In December 1907, the water department delivered the first filtered water and the city's typhoid rates rapidly began to drop. The city added a further level of protection – chlorination of supply - in 1912, with the result that Pittsburgh's death rate from typhoid fever dropped to the national average for large cities (Lanpher and Drake, 1930; Tierno, 1977).



Sewage Disposal: Retaining the Rivers as Sewers

Water filtration provided one safety net with regard to sewage-contaminated water but increasingly, as bacterial knowledge was more widely accepted, public health officers believed it necessary to treat city sewage prior to release in nearby streams and rivers for full water supply protection. They considered disposal by dilution inadequate treatment, and demanded that municipalities treat their sewage and that the state enact laws against stream pollution (Tarr, 1996b).

In 1905, in response to a severe typhoid epidemic in the city of Butler, the Pennsylvania state legislature approved a law "to preserve the purity of the waters of the State for the protection of the public health" (the Pure Waters Act)[1]. It forbade the discharge of any untreated sewage into state waterways by new municipal systems. While it permitted cities already discharging their untreated sewage to continue the practice, it required them to secure a permit from the state health commission if they wished to extend their systems (Snow, 1907).

Although Pittsburgh was filtering its own drinking water after 1907, the city continued to dispose of its untreated sewage into neighbouring rivers, endangering the water supply of downstream communities. In 1910, the city requested the Pennsylvania Department of Health (PADOH) to grant it a permit allowing it to extend its sewerage system. The head of the department, a public health physician, responded by requesting a "comprehensive sewerage plan for the collection and disposal of all of the sewage of the municipality" before it would grant the permit (Tarr, 1996b). In addition, the PADOH argued that in order to attain efficient treatment, the city should consider changing from a combined sewer system to a separate sewer system. The department's chief engineer, F. Herbert Snow, maintained that the plan was needed to protect the public health of communities who drew their water supplies from rivers downstream from Pittsburgh (Gregory, 1974; Tarr and Yosie, 2003).

The City of Pittsburgh responded to the PADOH order by hiring the noted M.I.T. trained sanitary engineers Allen Hazen and George C. Whipple to act as consultants for the required study. In their report the engineers maintained that a Pittsburgh sewage treatment plant would not free the downstream towns from having to filter their water supplies, since other upstream communities would continue to discharge raw sewage into the rivers. And, they noted, there was no case "where a great city has purified its sewage to protect public water supplies from the stream below" (Tarr, 1996b). Instead of building a sewage treatment plant, they maintained, disposal by dilution in the rivers was sufficient to prevent nuisances, particularly if storage reservoirs were constructed to augment flow during periods of low stream discharge.

Hazen and Whipple argued that the costs of converting Pittsburgh's combined system to separate sewers and of building a sewage treatment plant were prohibitive and would cause the city to exceed its municipal indebtedness level, a violation of state law. No precedent existed, they argued, for a city to replace its combined system with a separate system "for the purpose of protecting water supplies of other cities taken from the water course below" (Tarr, 1996b). A treatment plant, they added, would not give Pittsburgh any direct benefits while downstream cities would still have to filter their water to protect against waterborne disease. Hence, they concluded, "no radical change in the method of sewerage or of sewage disposal as now practiced by the City of Pittsburgh is necessary or desirable." In forwarding the Hazen-Whipple report to his superiors, N.S. Sprague, superintendent of the Pittsburgh Bureau of Construction, observed that "Rivers are the natural and logical drains and are formed for the purpose of carrying the wastes to the sea" (Tarr and Yosie, 2003).

The engineering press received the Hazen-Whipple report with enthusiasm, but PADOH commissioner Dixon found that it failed to meet his original request for a long-range plan for a comprehensive regional sewerage system. Dixon argued that water pollution had to be viewed from a health rather than a nuisance perspective, and that the immediate costs of sewage treatment would be outweighed by the long-range health benefits. The time had come, Dixon stated, "to start a campaign in order that the streams shall not become stinking sewers and culture beds for pathogenic organisms…" (Tarr,1996b). Given the political climate, however, and the city's fiscal limitations, Dixon had no realistic means by which to enforce his order. In 1913 he capitulated and issued Pittsburgh a temporary discharge permit allowing it to continue to discharge its raw sewage into neighbouring rivers.

Pittsburgh Treats its Sewage

For Pittsburgh to be compelled to treat its sewage would require major policy and value changes on the part of both government officials and the public. In 1923 the Pennsylvania General Assembly enacted legislation that created, within the Department of Health, a Sanitary Water Board whose function was to balance economic growth and improved water quality (Saville, 1931; Stevenson, 1923). The board created a stream classification system that designated streams into three categories for municipal and industrial users. These classifications included (1) steams that were relatively clean and pure; (2) streams in which pollution existed but could be controlled; and (3) streams that were so polluted that they could not be used as public water supplies without treatment or for fishing and recreational purposes, and therefore could continue to be used for the discharge of untreated wastes unless creating severe nuisances. Pittsburgh rivers fell under the third category; that is, they were to continue to be used as sinks for the city's wastes.

While some improvements were made in Pennsylvania water quality during the 1920s and the 1930s, Pittsburgh conditions remained static. By 1934, 85 percent of Pennsylvania waterways suffered from various degrees of degradation and the great amount of sewage discharged by municipalities was untreated. The Ohio River below Pittsburgh had a notable oxygen depletion zone and was contaminated by industrial wastes and mine acid. By the late 1930s, offensive sights and smells from the rivers had increased, as sewage from the city as well as from upstream communities overwhelmed stream oxidation capacity.[2] Many water supplies suffered from problems of taste and odour, and sewage contamination threatened to adversely impact public health (USPHS, 1944). While filtration and chlorination had sharply reduced typhoid death rates, diarrhoea and enteritis death rates remained elevated. In addition, ongoing leakage increased the costs of water filtration for Pittsburgh residents. These obvious water quality problems caused a gradual increase in citizen awareness that water pollution had adverse economic consequences, reduced environmental quality, and threatened the public health.

In 1937, in response to the demands of various stakeholders, including conservation groups and public health authorities, for improved stream quality, the Pennsylvania General Assembly passed the Clean Streams Act (Casner, 1999). This Act gave the Sanitary Water Board the power to issue and enforce waste treatment orders to all municipalities and most industries, notably excluding acid drainage from coal mines.[3]

Faced by a state law that provided the state authority with enforcement powers, the city and other western Pennsylvania towns were forced to seriously consider means to reduce their river pollution. Halting movement towards reform began in the late 1930s, only to be interrupted by the outbreak of World War

II. In 1944, however, with the war coming to an end, the Sanitary Water Board announced comprehensive plans to reduce pollution of Pennsylvania streams. In a major step, it required that all municipalities treat their sewage "to a primary degree." In June l945, it issued orders to the City of Pittsburgh and 101 other Pennsylvania municipalities, including more than 90 Allegheny County industries, to cease the discharge of untreated wastes into the state waterways. State officials decreed that these communities comply with the treatment orders by May of 1947 (Yosie, 1981).

Municipal and county officials reacted with consternation to the 1945 state waste treatment orders, as they confronted difficult administrative and technological issues. Among the most pressing were questions as to whether sanitary policy should be determined by each municipality or by a regional agency; how sewage treatment should be financed; whether a central treatment facility or multiple disposal plants would be most efficient; and what form of treatment technology made the most sense given the existing system of sewage collection and drainage and local conditions of population density and topography (Yosie, 1981).

Many meetings and a barrage of publicity for sewage treatment finally produced a pro-authority consensus, and seventy-four Allegheny County communities agreed to join a sanitary authority. In March, 1946, the Secretary of the Commonwealth of Pennsylvania officially approved the formation of the Allegheny County Sanitary Authority (ALCOSAN) (Laboon, 1973). Helping to advance the creation of this Authority was the fact that water quality issues had become linked with a more widespread political and economic thrust called the Pittsburgh Renaissance, which aimed to improve the quality of life in Pittsburgh and to reinvigorate its economy (Lubove, 1969).

A number of critical decisions were made as to the method and extent of sewage treatment. County municipalities with a population of 678,000 and various industries collectively discharged 65 million gallons of wastewater per day. The authority decided to remove 50 percent of the biochemical oxygen demand (BOD) generated by wastes entering its proposed activated sludge treatment plant, thereby complying with or exceeding state discharge standards. The research staff recommended that a single plant would create fewer nuisances and be more cost-effective than multiple plants. Sewage would be collected from various outfalls throughout the service district by an extensive system of interceptors that would transport wastes to the treatment works. Sanitary officials would determine service charges by metering water consumption levels at the household tap or plant site, and individual municipalities would be responsible for owning and maintaining their own collection systems. Eventually, 83 of 131 municipalities joined the authority, although the refusal of the remainder to join reflected the region's governmental fragmentation and the difficulties of securing consensus on governmental issues.

On October 1, 1958, after a four-year loan of $100 million had been secured, the official dedication of the plant occurred, and treatment of the wastewater of Pittsburgh and that of many of its neighbours became a reality (Tarr and Yosie, 2003). Water quality conditions in the rivers greatly improved over the years, as levels of treatment were upgraded. The collapse of the steel industry in the 1978-85 years, while economically costly, resulted in further improvements in river water quality. Yet, although sewage treatment had been accomplished, the basic combined sewer collection system for Pittsburgh and a number of other neighbouring municipalities remained in place. Under wet weather conditions, these systems continued to discharge untreated raw sewage through overflow relief valves, creating pollution in the receiving streams and rivers. While sewage treatment had made the rivers far cleaner than they had been for many decades, major tasks still remained to be accomplished.

Sanitary Sewer and Septic Tank Overflow Issues

While the combined sewer system of Pittsburgh and other county towns is a major cause of river pollution, other sources also exist. Some towns and many Pittsburgh suburbs that developed after 1945, although not having combined systems, also had sewerage systems that were problematic. One set of problems related to those communities that had separate sanitary sewers rather than combined sewers. In these communities, theoretically, domestic wastes would flow into the separate sewers while rain waters were to be handled by storm sewers or, in their absence, by surface channels. In many communities, however, in the absence of storm sewers, developers and householders connected roof drains to the sanitary sewers in order to reduce flooding. These connections caused separate sewer overflow problems and the overloading of sewage treatment plants, often resulting in flows of raw sewage into the rivers. Such connections were, according to one authority, the "construction standard" in Allegheny County. The county prohibited such connections in the 1960s, and the 1987 amendments to the Clean Water Act prohibited sanitary sewer overflows (Investing in Clean Water, 2003). However, no real action was taken to stem these problems until the 1990s. Problems persist today although plans are being developed to remedy these conditions as well as to control storm water flows.

Another set of problems relating to wastewater issues in older rural areas, former mining patch towns, and fast growing suburban communities. These communities relied on a patchwork of community and on-lot sewage disposal methods, characterized by a lack of oversight of system sitting and design, construction and maintenance. These conditions frequently resulted in inadequate and malfunctioning wastewater systems. These substandard wastewater systems had characteristics such as straight piping of sewage from homes to streams or ditches, septic tank discharge directly into streams or ditches as well as into groundwater, sewage discharges into abandoned underground coal mines, and failed or malfunctioning community "package plant" treatment systems. In many of the older communities, no records exist of the systems.

Postwar prosperity produced a housing boom in Pennsylvania but also resulted in a proliferation of poorly operated small treatment systems. In the 1950s, there were supposedly between 500,000 and 1,000,000 malfunctioning on-lot septic systems throughout the state. These conditions existed throughout the nation but were especially problematic in western Pennsylvania because of geological factors (Rome, 2001). The region's bedrock is extensively fractured, dominated by poor shallow soils, a high water table and sloped terrain, providing potential avenues for contaminants to enter groundwater. The region is one of the most challenging in the country for use of on-site sewage treatment and disposal systems such as septic tanks. Concerns about surface water and groundwater deterioration, and the accompanying public health risks, led to the passage in 1966 of legislation to regulate septic systems but many problems still remain (ELI, 1999).

Conclusions

This paper has explored the series of critical decisions made over time that have produced a contemporary sewage pollution problem in the Pittsburgh region. These decisions involve issues of the location of water supply and wastewater disposal, technology choice in regard to sewerage system design, conceptions of the public health, and the larger role of rivers in human society. Across this history, however, there are four major crosscutting themes that relate to most urban environmental issues - -- issues of resource and technology choice, public health, financial costs, and the political and institutional context.

The first theme relates to the city's decision to obtain its water supply from its neighbouring rivers rather than from a protected up-country source. This decision was costly in public health terms when the rivers became wastewater disposal sinks for both Pittsburgh and other upstream cities. The technological decision -- to build combined rather than separate sewers -- had short and medium term benefits but long term environmental and health costs that remain today. The slow sand filtration system that began operating in 1907, along with chlorination (1912), and later improvements in the 1920s, served the city well for a long period of time, providing high quality drinking water. However, its success in dealing with typhoid fever meant the city delayed in treating its sewage and also its industrial wastes. Pittsburgh's refusal to treat its own wastes provided a negative model for other cities in the watershed to threat theirs.

The negative consequences of technological decisions for public health and the environment, as well as a willingness to ignore the destructive effects of industrial pollution, were exacerbated by regional institutional and political structures. Filtration of the city's drinking water was actually delayed by political factionalism at the beginning of the 20th century. Political competition between city and county, as well as rivalry and provincialism on the part of the county's many municipalities, impeded cooperation in meeting environmental goals. The damaging effects of this political fragmentation was demonstrated throughout the twentieth century in regard to environmental issues and the formation of new institutions such as ALCOSAN created to deal with pollution issues.

From a policy perspective, Pittsburgh's environmental history bears heavily on the present in regard to water quality. Here the concept of path-dependency is useful, because it illuminates the burdens that the present bears from the continued use of imbedded water and sewer technologies (Melosi: 2000). The city's water distribution and combined sewer systems are both old, and suffering from various problems, although over the past decade more attention has been paid to the former rather than the latter. The city has been free of water-borne disease for some decades, and has been fortunate enough to escape episodes of exposure to Giardia or Cryptosporidium from which other cities such as Milwaukee have suffered. However,

During the winter of 1983-1984, an outbreak of waterborne giardiasis (347 cases) occurred in McKeesport, a town located south of Pittsburgh. A combination of factors resulted in the outbreak, including inadequate maintenance of treatment equipment and reliance on older filter designs (Sykora et al. 1986). Pittsburgh has much more well-maintained water treatment facilities than did McKeesport, but the possibility of an outbreak cannot be ignored.

More pressing is the legacy of the city's combined sewer system and those of neighbouring towns. Pittsburgh today has more combined sewer overflow outlets than any other city in the nation, leading to rising fecal coliform rates in the rivers at times of wet weather. The fecal pathogen contamination is a threat to recreational users of the region's waterways, and from 1994-2001, the Allegheny County Health Department issued pollution warning on 37 per cent of the days in the recreational boating season. Today the city, county and region, under prodding from the U.S. Environmental Protection Agency, have moved to study and seek alternative options to deal with the issue (Investing in Clean Water, 2002).

Finally, the history of Pittsburgh water supply and wastewater disposal reveals the constant importance of political and institutional factors within the city and the county. The city has experienced political factionalism and competition between departments with different goals over the years. Within the larger county we have experienced competition between city and county, between city and suburb, and between different municipalities. These situations have shaped the character and timing of the water and wastewater decisions that have been made, suggesting that it is only through regional cooperation that the full potential of the region's rivers will be reached.

Notes

[1] The Pure Water Act was the first Pennsylvania state legislation specifically related to water quality. The Act sought to preserve the purity of the waters of the State for the protection of the public health. It forbade the discharge of any untreated sewage into state waterways by new municipal systems. While it permitted cities already discharging to continue the practice, it required each to secure a permit from the Pennsylvania State Health Commissioner if they wished to extend their systems.

[2] Field tests conducted by the PADOH, for instance, showed that the dissolved oxygen level at many Ohio river locations was below four parts per million—the minimum level necessary for the maintenance of aquatic life. In 1943, a U.S. Public Health Service (USPHS, 1944) study of the Ohio River reported that the organic waste load reaching the Ohio River from Pittsburgh and its suburbs had a population equivalent of 1,334,300. The USPHS report also noted that the concentration of organic waste on the river below Pittsburgh was larger than that below any other community on the Ohio River.

[3] Some authorities had argued that the mine acid drainage neutralized bacterial wastes (see Casner, 1999).

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