Unintended Consequences : When Good Water Goes Bad

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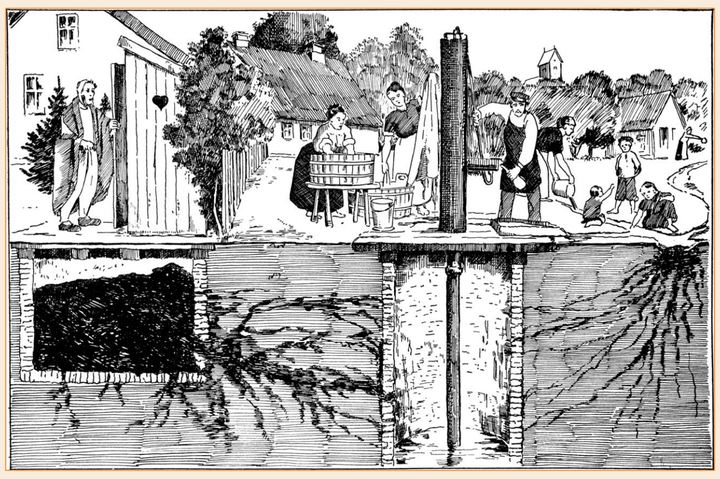
Our drinking water is fine, right?



More Water, More Problems?

When we identified the cities in New Jersey that built the earliest water infrastructure, we observed that most cities did not build their drinking water and sewer systems at the same time. *Why not?*

This map is one product of our exploration of the relationship between population size and drinking water and sewer systems, and our development of a historic context for water infrastructure.

As populations and industrial activity increased in the 19th century, the rivers, springs, and wells that people used for drinking water became polluted. In response, cities built elaborate systems to pipe clean water directly to homes and factories. Indoor running water had an unintended consequence: with clean water readily available, homes and businesses used much more of it. The dramatic increase in the use and discharge of water from factories, kitchens, laundries, and bathrooms caused privies and cesspits to overflow and further contaminate the surrounding soils and rivers. Sanitary engineers responded to this increase by designing systems to carry the wastewater away.

Which came first, the drinkin' or the egg-shaped sewer?

How long did it take for the increase in wastewater to become a nuisance? The map shows 43 cities that developed both drinking water and sewer systems before 1900. As the graphs show, most cities built drinking water systems first, suggesting that the increased need for sewers was truly an unintended consequence.

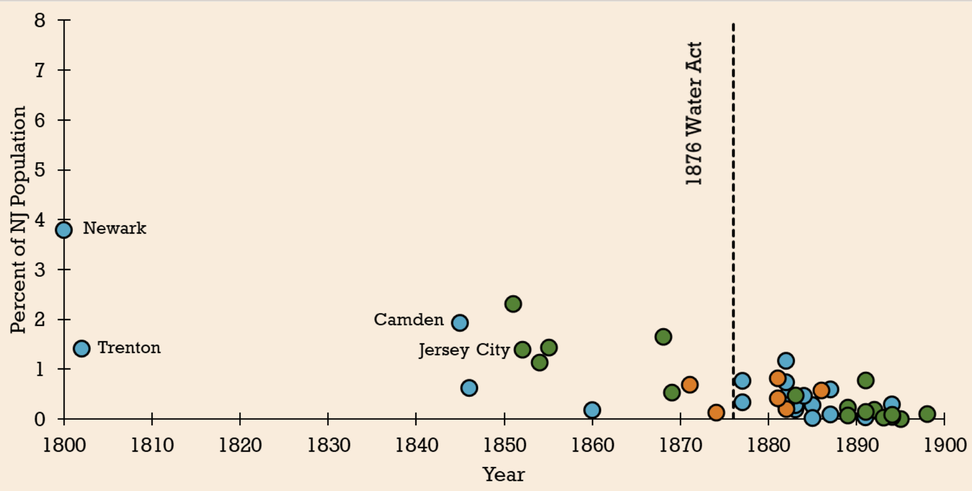
While the town of Morristown formed New Jersey's first chartered private water company in 1799 after a drought left wells dry, it was larger industrialized cities like Camden, Newark, and Trenton that tended to develop drinking water systems first. These cities didn't build municipal sewer systems until much later.

Some cities did build both sewer and drinking water systems at about the same time. Notably, Jersey City was the first city in the United States to do so.

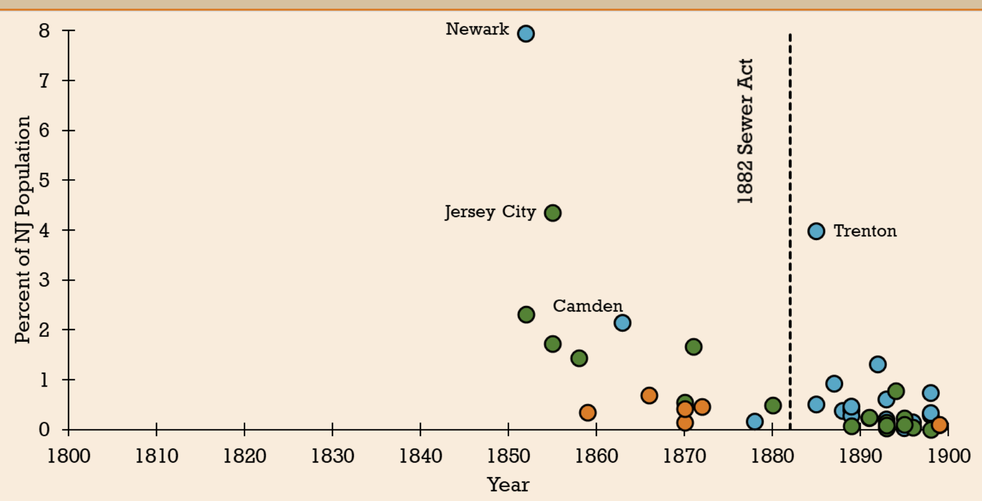
Bayonne, Cape May, Harrison, Perth Amboy, Rahway, and Raritan installed a sewer system before there was a municipal water system. Perth Amboy constructed water pipes 22 years after the sewers.

Many cities were spurred on to build systems with the passage of the 1876 Drinking Water and 1882 Sewer Acts, which authorized municipalities to construct, maintain, operate, and alter systems.

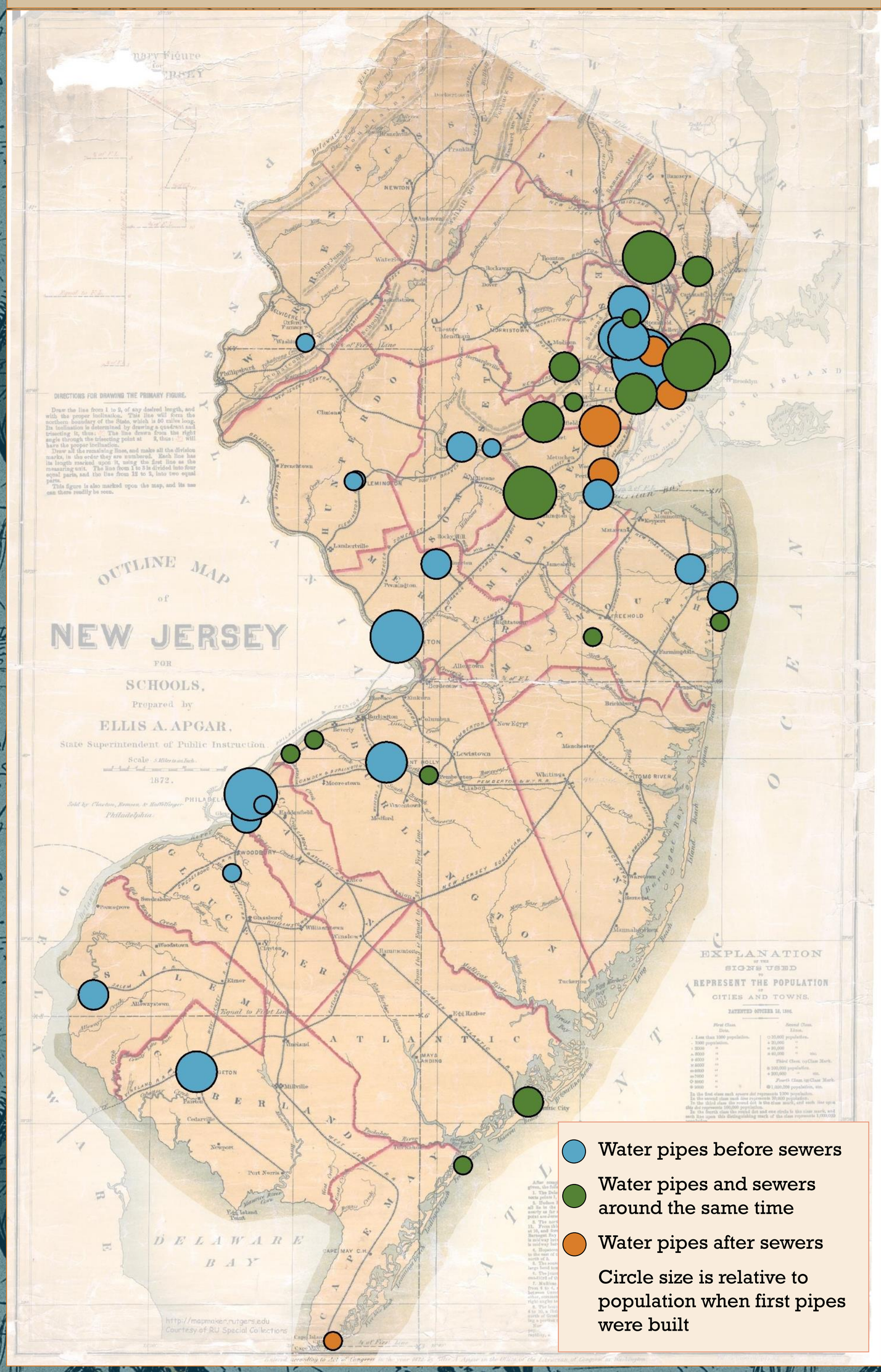
City Size at Water Construction



City Size at Sewer Construction



Sewer and Water Systems by 1900: City size and Order of Construction



Effect and Cause

Most cities built drinking water systems first. Some areas had existing ad hoc drainage systems that were converted (not always legally) to sewers, which may explain some of the lengthier construction intervals. Many other variables must have been in play, such as population density, geology, soils, proximity to waterways in which effluent could be discharged, and proximity to other towns (who might not appreciate another city's wastewater entering their drinking water supply). And, of course, economics and politics most certainly played a role. Every city has its own story, and further research will bring these stories to light.