

In the midst of Philadelphia's water shortages and epidemics, Joseph Wharton (below) looked to New Jersey's Pine Barrens.

Water for Philadelphia

Joseph Wharton and the Pine Barrens

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The city of Philadelphia plays a significant part in the history of water management and treatment in the United States. The city made numerous advancements early on in the nineteenth century in providing water to the public. New technologies were continually being developed, and Philadelphia became famous for having the nation's first municipal water system. However, this suffered severely in the beginning, experiencing many downfalls and failures. Early machines were dangerous—even deadly—and water sources became severely polluted. Despite close access to both the Schuylkill and Delaware Rivers, Philadelphia faced a water shortage crisis.

As the city of Philadelphia looked for solutions, so did individuals. Joseph Wharton is one of these individuals who saw potential business advantages in the situation. Developing a plan to get water from New Jersey's Pine Barrens, Wharton saw an opportunity to completely change Philadelphia's water system.

Philadelphia both benefited and suffered from the Industrial Revolution. Industry was expanding, and the business world was experiencing a growth like never before. The economy of Philadelphia was improving immensely. However, the Industrial Revolution took a huge toll on Philadelphia's environment. In



particular, the Schuylkill and Delaware Rivers became extremely polluted during the time period. The Schuylkill River is of main concern, as the Philadelphia Water Department determined early on that the Delaware River was not suitable for drinking water.¹

Due to upstream mining, industrial pollution caused serious problems in the Schuylkill River. Factories were dumping their waste directly into Philadelphia's streams and rivers, and as the population upstream increased, more and more human and animal waste was being dumped into the river. Similarly, towns like Reading and Pottsville dumped their waste directly into the Schuylkill River and, though many miles upstream, without treatment, it remained and festered in the water.²

In Philadelphia during the 1790s, a yellow fever epidemic killed approximately twenty percent of the city's population.³ Even though the disease was really spread by mosquitoes, dirty water eventually became the suspect. Other epidemic diseases, which killed thousands more Philadelphians, were being transmitted from human to human by ingestion of food or water containing feces from an infected person. Providing proper sewerage and drainage became a huge matter for the city, and city engineers began planning the culverting of creeks in advance of development.⁴ Though the population demanded cleaner water, people were not always

completely willing to pay for improvement projects.⁵ By 1799, the Philadelphia Water Department financed a plan which resulted in a station being built on the Schuylkill River.⁶

This station involved a steam engine that pumped water from the Schuylkill River to Centre Square, which is now the location of Philadelphia's City Hall. Then, a second steam engine pumped the water into a tower reservoir, which was then fed through wooden pipes to hydrants using gravity. Citizens had to pay for the construction of a connecting pipe and also pay a yearly fee in order to get water sent to their homes. Eventually named the Centre Square Water Works, the first municipal water system in the nation pumped water for the first time in 1801. This facility, however, only served Philadelphia for about a decade. Breaking down frequently due mostly to boilers exploding, it left Philadelphians without running water for long periods of time.⁷ The city needed something bigger, safer, and more efficient.

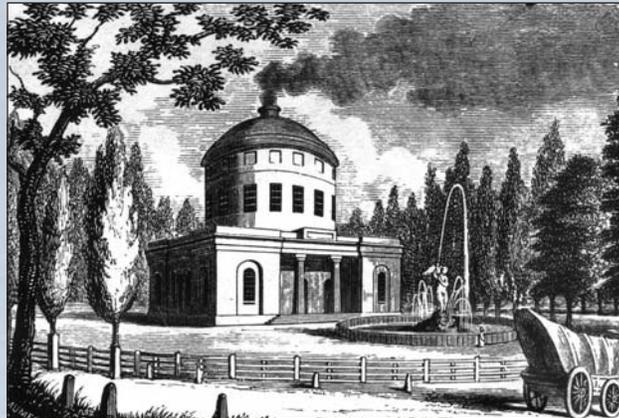
First, another steam engine powered structure was developed on Faire Mount, a flat area of land located near the west bank of the Schuylkill River. Faire Mount was an ideal location, serving as both the highest point bordering the city and as a point close to the river. However, steam engines proved to be too dangerous, killing numerous workers

throughout the years. The engines also caused too much pollution. By 1822, the Philadelphia Water Department developed a system that operated pumps with water power.⁸ A large dam was built to direct the water to specified locations, and five basins served as reservoirs for storage. Known as the Fairmount Water Works, this new site was more efficient, and the image of the industrial site became extremely famous. Philadelphia was known for its clean water supply that was provided after the Fairmount Water Works

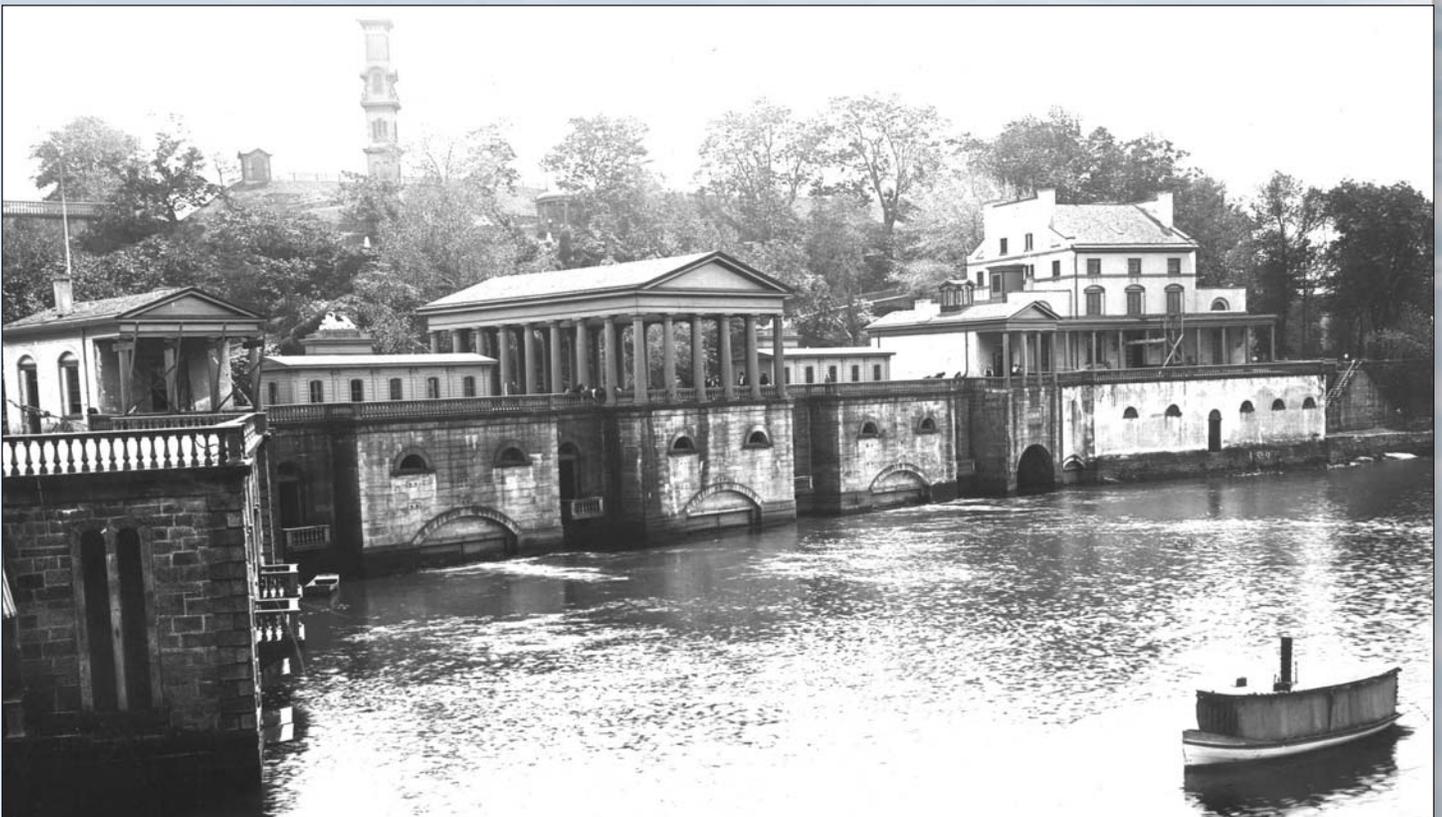
was built. Still, the only treatment going on at this time was letting the water sit in the reservoirs long enough for some particles to settle.⁹

The Fairmount Water Works provided water to Philadelphia for many years and allowed the city to continue to grow. People from all over stopped to see the Fairmount Water Works when in Philadelphia. Tours of the waterwheels and pumps were taken by tourists constantly, and the tradition of rowing and boating on the Schuylkill River began to grow. This gave rise to

the idea of developing Fairmount Park in order to prevent further pollution. The city decided to purchase land along the Schuylkill River to keep it from becoming industrial or residential land. The unspoiled parkland was meant to protect the watershed to ensure Philadelphia would have access to quality water. In 1855, the city



The Centre Square Water Works



The Fairmount Water Works

acquired the Lemon Hill Estate, and the Sedgely Estate was acquired a year later.¹⁰ Many of the big houses were allowed to remain, because they did not pose a threat to the water quality. As development expanded west and north, however, many villas were abandoned or forcefully acquired by the city.¹¹ Fairmount Park continued to grow, and the park achieved its goal of preventing further pollution of the Schuylkill River for much of the first half of the 19th century.

However, the park couldn't balance the gigantic growth in population and economic activity that led to a shortage of water and even more pollution of the river in the second half of the 19th century.

Investigations made during 1883 and 1884 show just how serious the pollution of the Schuylkill River was. The report lists materials used in factories discharging waste into streams. All materials used or produced in these factories could potentially be found in the river. Some examples of what was possibly being dumped into the Schuylkill River are caustic soda from woolen mills, cloth rags from paper mills, oxalic acid from dye houses, chloride of lime from print works, very thick, pulpy waste from gas works, hen manure from tanneries, grease from soap works, beef legs from glue works, bones from neats-fit oil works, grain from malt houses, whiskey from distillery, blue vitriol from wool hat factories, and hypneric

from fur hat factory.¹² These are only a few examples from the list of possible pollutants. The report also tested the taste and smell of the Schuylkill, Perkiomen, and Delaware River waters. The smell ranged from none to very unpleasant, and the taste ranged from slight to very unpleasant.¹³

During the 1890s, typhoid epidemics spread throughout Philadelphia, killing thousands of people each year.¹⁴ Waterborne diseases became a huge crisis for the local authorities. The city began to develop filtration technology, using sand/gravity filters,

but it took several years to become successful in removing significant qualities of solid waste.¹⁵ Although some waste was removed, water was not disinfected. It would not be until 1912 that the city would begin chlorinating water.¹⁶ Also, the river had to be dredged a few times, because the water was moving very slowly when approaching the dam, causing the river to fill with silt.¹⁷ This silt was used for topsoil when buildings were bought and demolished for more park land.¹⁸ Clearly, Philadelphia needed to make changes, and Joseph Wharton attempted to accomplish

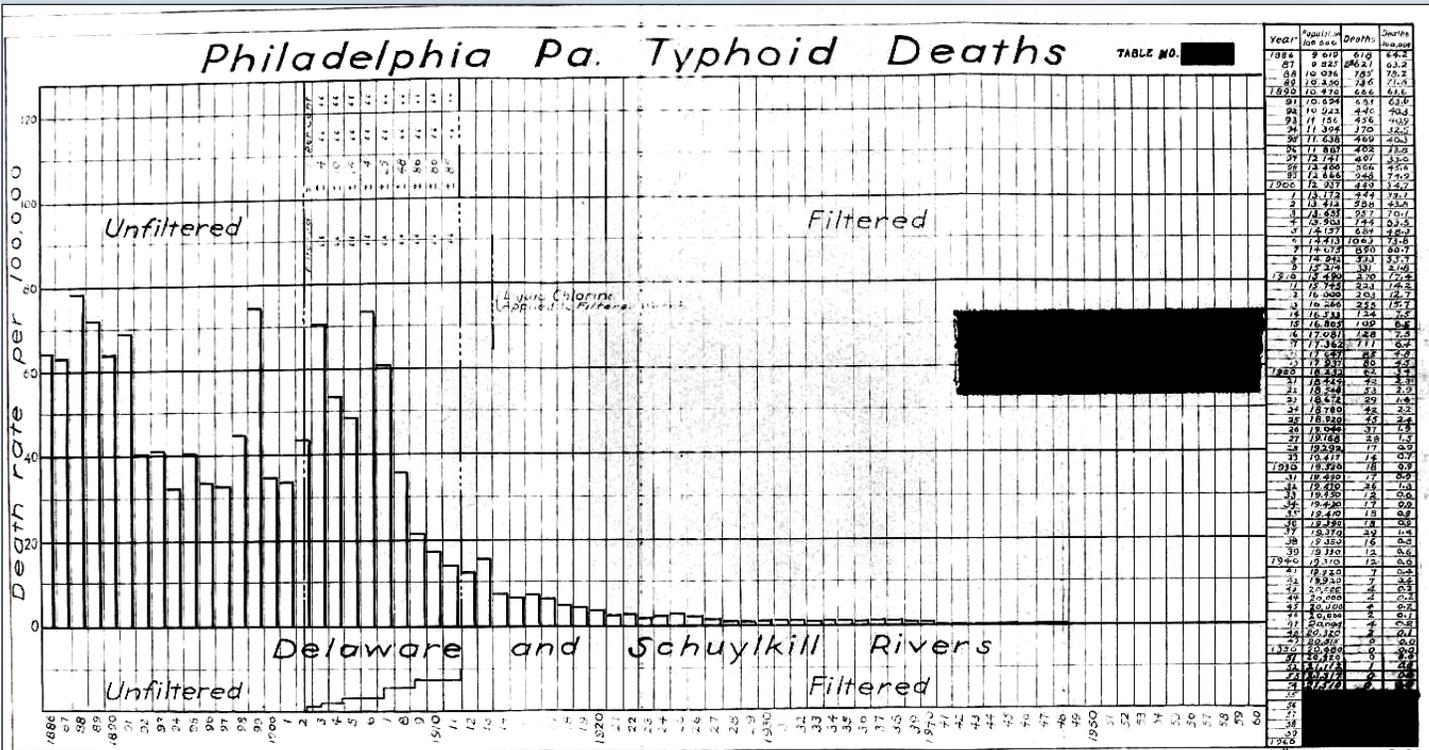
Summary of Statistics of Pollution of Schuylkill River.
Investigations made from December 16th, 1883, to January 14th, 1884.

ITEMS.	DISTRICTS.						
	FIRST. (Whole Valley above Fairmount)	SECOND. (From Upper Mouth of Merion to Mouth of Chestnut Creek.)	THIRD. (From above Merion to Mouth of Chestnut Creek.)	FOURTH. (From Fairmount to Mouth of Chestnut Creek.)	FIFTH. (From Keston to Mouth of Chestnut Creek.)	SIXTH. (From Chestnut Creek to Mouth of Fairmount.)	SEVENTH. (From Fairmount to Mouth of Fairmount.)
Drainage Area.	654.9 sq. mls.	290.0 sq. mls.	149.4 sq. mls.	57.6 sq. mls.	20.9 sq. mls.	38.8 sq. mls.	74.6 sq. mls.
Population.	31,000	66,000	35,500	44,800	18,500	35,500	48,800
DIMINISHED SEWAGE.							
Daily Water Supply* Representing Domestic Water Used.	2,650,000 gals.	4,500,000 gals.	2,000,000 gals.	918,000 gals.	983,000 gals.	1,000,000 gals.	1,000,000 gals.
Population having Direct Waterworks Drainage†.	4,300	600	300	1,300	1,300	675	1,700
Population having Indirect or Filtered Water-works Drainage—Direct on Banks of Stream, Complete with Overflows to Sewers or Streams, etc.‡.	2,500	4,300	3,000	1,300	1,300	1,300	4,300
Population having complete Drainage by Water Carriage to the River.‡	3,900	1,300	800	1,000	100	300	300
Population having Direct Drainage for Work Water only.‡	3,500	1,300	1,000	400	500	300	400
Population having Indirect Drainage for Work Water.‡	13,000	13,000	2,200	3,200	1,000	3,000	4,000

* From public supply only.
† Persons who do not have sewerage are included in the remainder of this column.
‡ Including population in mills having private sewer systems, or who discharge directly into stream.
§ Estimated from data obtained from measurements, through surveys and other local authorities, and from observation.
¶ Including house drains at Fairmount.
‡ Estimated from data obtained from through surveys and other local authorities, and from observation.

Pollution statistics for the Schuylkill River.

this. Born on March 3, 1826 to Quaker parents in Philadelphia, Joseph Wharton spent the first sixteen years of his life alternating between Quaker boarding schools and having private college prep tutors.¹⁹ At the age of sixteen, however, he decided to desert this



The effects of filtration on reducing typhoid deaths in Philadelphia are readily apparent in this chart. Water for Philadelphia • Arthur M. Holst, Ph.D. • GardenStateLegacy.com Issue 3 • March 2009

course to pursue becoming a Quaker farmer. When Wharton was nineteen, he began to gain some skills he would need as a future industrialist. He received an accounting apprenticeship, had projects involving white lead manufacturing, cottonseed oil extracting, brick making, and managed the Pennsylvania and Lehigh Zinc Company for six years, of which he was able to turn a profit from the struggling company.²⁰

In 1863, Wharton decided to retire from the Zinc business. Instead, he began to manufacture nickel with his company, American Nickel Works.²¹ A few years later, Wharton began buying into Bethlehem Iron. He eventually became the largest shareholder of the company. In 1902, American Nickel Works was sold in order to form the International Nickel Company, for which he served on the board of directors.²² In addition to profit gained from all of these companies, Wharton had a business of producing fish oil on an island in Great Bay, New Jersey and a cranberry farm on his Pine Barrens land.²³

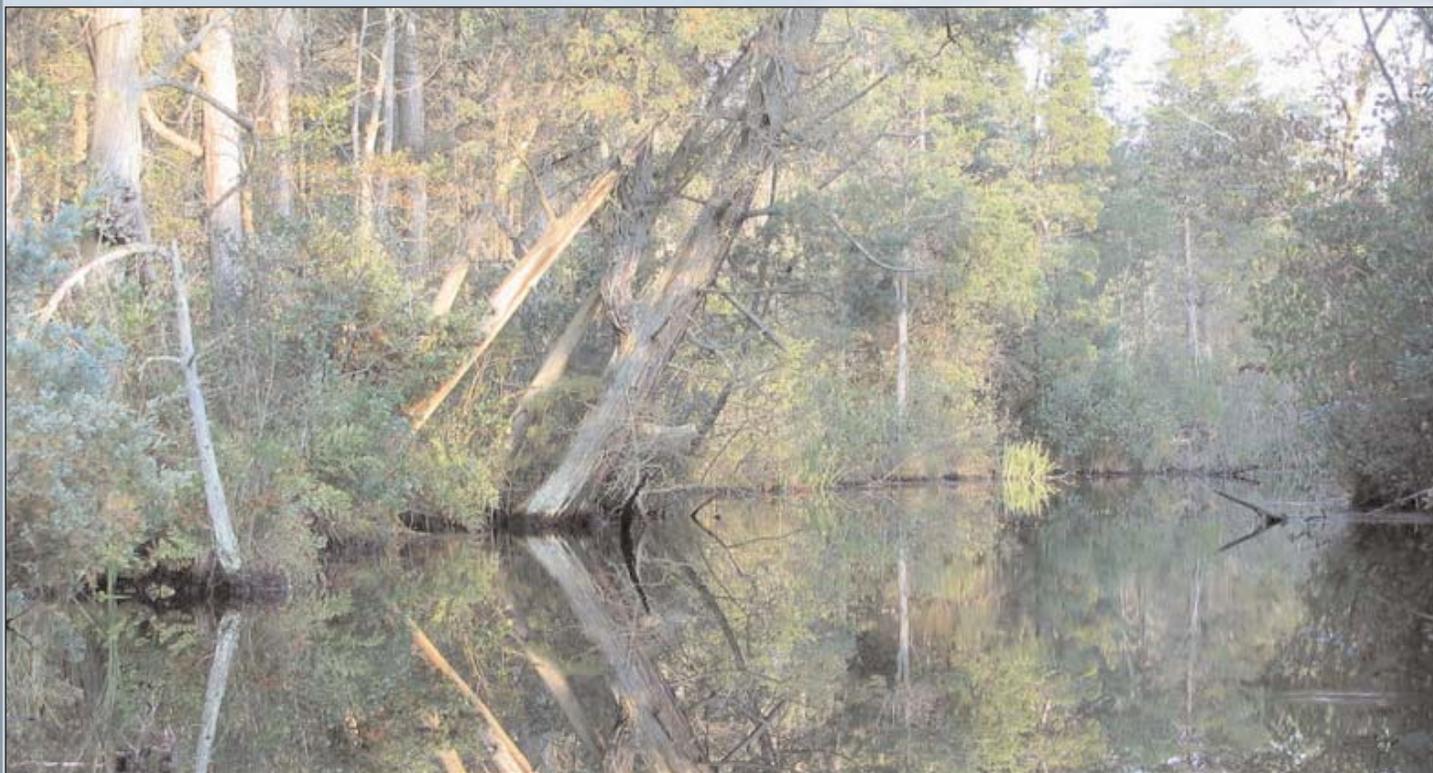
Wharton began purchasing land in New Jersey's Pine Barrens in 1873.²⁴ Why he began buying land is debatable. One suggestion is that he began buying land in order to expand his farming business.²⁵ As mentioned, Wharton received training to be a Quaker farmer. He spent time growing many things, including cranberries, peanuts, sugar beets, sweet potatoes, corn, and lumber/timber/charcoal.²⁶ He also was involved in raising livestock. His fish factory in Great Bay, New Jersey made poultry feed and fertilizer.²⁷ Acquiring more land is an obvious necessity if wishing to expand a farming business by producing more goods. Another suggestion as to why he began to buy land involves the belief that Wharton had about the conservation of natural resources. He believed that this cannot be accomplished by keeping them in the public domain—the only way to do so is by private ownership.²⁸

The third suggestion—and the most likely to be the actuality—is

related to Wharton and his family's estate. The estate was going to be annexed by Philadelphia in order to make room for a new water reservoir. In 1854, Philadelphia increased the city limits to include the estate, giving right of eminent domain over it.²⁹ As mentioned, due to the water crisis Philadelphia was facing during the time period, the city wanted to build an extra reservoir to hold the water for a longer time before distribution in order to help clean out the pollution. Therefore, he tried to devise a plan to ship water from the aquifer in the New Jersey Pine Barrens to Camden and Philadelphia.³⁰ Spread out over 1.4 million acres, the Pine Barrens primary source is water.³¹ Wharton saw it as a way to protect the estate and as a business opportunity.

Wharton purchased the Basto Estate in 1876 for \$14,000, and he eventually put another \$40,000 down on renovations. Although some believe he bought the land to grow sugar beets, cranberries are the more obvious choice due to the climate and bogs of the Pine Barrens.³² Used to package cranberries, his Atsion estate and headwaters were purchased in 1892.³³ The headwaters were used to protect the purity of the aquifer, because though the Pine Barrens have some of the cleanest water in the United States, contamination can spread due to the sandy soil where the aquifer is.³⁴ Also, there were old, abandoned industrial towns in the area with cheap land for sale, which allowed Wharton the ability to create one continuous track of land.³⁵

The New Jersey Pine Barrens can be thought of as one high, slow moving, sandy, swampy lake where in low places the water is able to collect enough to form real rivers and lakes.³⁶ The two major rivers in the Pine Barrens are the Atsion and the Mullica.³⁷ Wharton's plan to get water to Philadelphia from the Pine Barrens involved using canals and lakes. A system of dam-formed lakes would be centered around three main collection lakes. The most easterly lake would be at thirty feet above sea level, the middle lake



The Mullica River in the New Jersey Pine Barrens. Wikipedia; Taken by User:Mwanner, 9 September, 2005.

would be at fifty feet, and the highest lake would be at seventy feet above sea level, near the lands natural divide for water run off.³⁸ The water of the lowest lake should back all the way up to the base of the middle lake, allowing it to be easily lifted up to the highest lake.³⁹ The same process would be applied with the highest lake. It would resemble a large three-tiered terrace of lakes.

Furthermore, Wharton planned for a five mile canal cutting through the divide, which would have a low point of ninety feet.⁴⁰ This canal would carry the water from the highest dam into the valley on the other side of the divide flowing west.⁴¹ Here, water from west flowing streams would be added to the flow of the canal, eventually dumping into one gigantic lake, which Wharton proposed to name Haddon Lake, near Haddonfield at an elevation of sixty-one feet.⁴² From here, water output would be controlled and flow by gravity through a canal to Camden and into pipes or a tunnel under the Delaware River into Philadelphia, where it could be pumped up to ground level for distribution.⁴³ Anything between thirty feet above seal level on the east side would be allowed to run into the sea.

Wharton's plan to get water from the Pine Barrens for Camden and Philadelphia received great opposition from both New Jersey and Pennsylvania. A New Jersey law passed in 1884 made it illegal to convey any state waters beyond the borders of the state. The law made it illegal to sell or dispose of any of the rights, privileges, or franchises to any person or persons or corporations for such a purpose.⁴⁴ This kept the water available to New Jersey, though they had never used it. Wharton had difficulties getting lawmakers interested in the issue. There came some similar resistance in Pennsylvania from lawmakers who wanted to keep their water domestic. They were more interested in trying out the new filtration method of obtaining pure water.⁴⁵ They felt it would be too much

work to try and have New Jersey overturn their law.

In 1882, Wharton produced a pamphlet about his plan, but it failed to spark any significant interest. A year later, a fire in the Pine Barrens destroyed much of the value of the timber.⁴⁶ This disaster caused Wharton to lose a great deal of hope in making a profit from his land. In 1895, Wharton updated and reprinted his pamphlet and presented it to the Philadelphia City Council.⁴⁷ However, during the hearing, council members began slipping out one by one to go to tend to supposedly more important tasks. Eventually, so few were left that the hearing was officially ended. Around this time, however, Camden became interested in hearing Wharton's plan. But Wharton refused their bid, arguing that Camden is not big enough to warrant building the infrastructure required to get the water there.⁴⁸

Despite these failures, Wharton continued to propose his plan. In 1896, the chief of Philadelphia's water bureau, William C. Trautwine, showed some interest, but no decision was ever made.⁴⁹ In 1898, the Philadelphia City Council voted 52–20 against building a filtration plant.⁵⁰ When asked a year later about New Jersey's law regarding not sending state water outside the state borders, Wharton felt that he could still deliver water to Philadelphia without any objection from New Jersey. By 1900, the Philadelphia City Council had the people vote on a referendum for a filtration system, but Wharton declined to try to put together a coalition to push for his plan. By then, he was clearly tired and bitter about the idea. Wharton stopped publicly trying to get his plan approved, but he continued to buy land. He purchased 26,000 acres between 1898 and 1902, and continued on until his death, still believing at some point in time Philadelphia would have to eventually concede to buying his naturally clean water.⁵¹

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