



# Guide for The Optimization of Potable Water Distribution in Puerto Rico

Polytechnic University of Puerto Rico  
Civil and Environmental Engineering and Land Surveying Department  
WI-18

Author: Juan D. Aguero Hernandez

Adviser: Dr. Christian Villalta, PhD



## Abstract

The system of distribution of drinking water is one of the most important infrastructures of any population in the world, water is necessary to cover the basic needs of human beings, and also to maintain a healthy flora and fauna. Therefore, all the populations must have an optimal drinking water distribution system that can meet the needs of all. These systems of distribution of drinking water are very affected by the deterioration caused by the use and wear through time, lack of maintenance, Puerto Rico in an orderly and efficient manner, with the use of advanced technology in terms of geography and instrumentation. The optimization guide is focused on ensuring that the distribution of water provides a high-quality service to the entire population, locating all the components of the distribution system and monitoring them. The optimization guide is focused on ensuring that the distribution of water provides a high-quality service to the entire population, locating all the components of the distribution system and monitoring them. This guide would help facilitate the field operations of the water distribution system. They will have access to more advanced and accurate technology tools. With which all the design standards of the Aqueduct and Sewer Authority of Puerto Rico can be met.

## Methodology

In the methodology we will see all the elements that will be part of the optimization guide and how they will be developed in the implementation of the guide in the drinking water distribution system. The elements that will form the methodology will include implementation of the Geographical Information System (GIS) program, create a complete inventory of all components of the distribution system and that it can be monitored and controlled with the Supervisory Control and Data Acquisition system (SCADA), inventory sheet in the field. The following information explains the function of each element of the methodology that will be implemented in the drinking water distribution system to be developed in this investigation

## Case of Studies

In the western region of Puerto Rico, specifically in the municipality of Rincón, many sectors with a deficiency in the drinking water service have been reported. This system is operated by the Aqueduct and Sewer Authority of Puerto Rico (PRASA). Many of these deficiencies are low water pressure, places where water does not reach, or constant service interruption. They also have problems with the equipment and components of the drinking water distribution system. The system has a current demand of 1.4 GPD. This demand is to supply a population of approximately 5,300 people, which means a high volume of drinking water flow and a broad distribution system. The objective of analyzing this drinking water distribution system is to optimize the distribution of drinking water in the area using the optimization guide that was developed in this project.

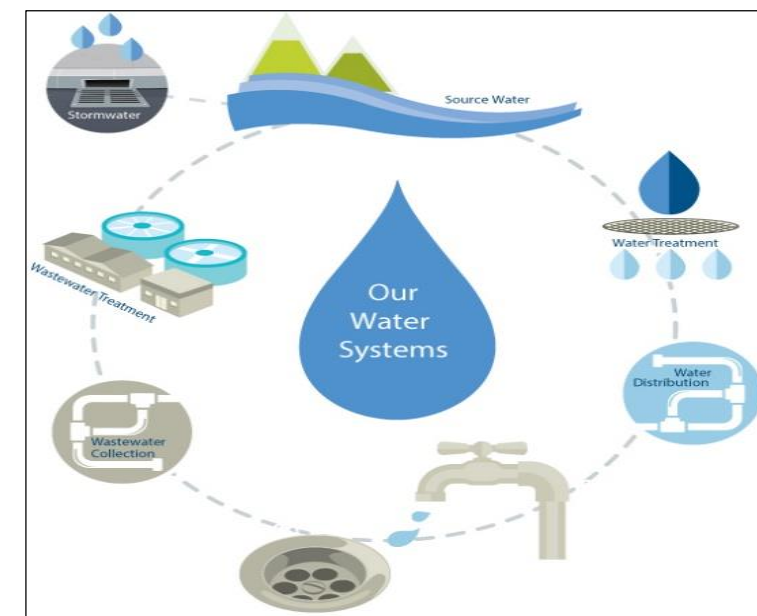
## Conclusions & Recommendations

These systems of distribution of drinking water in Puerto Rico have been abandoned and neglect are not given proper care or maintenance. We see that the equipment is not updated with modern and quality technology and field studies are not carried out to determine the state of the equipment. There are no studies to update the demand for drinking water. These systems must be fully optimized. The system of Geographic Information System (GIS) must continue to be developed in all distribution systems in order to continue to know more about the entire geography and infrastructure of water distribution. It is recommended to expand the Data Supervision and Acquisition Control (SCADA) system that is already installed in some regions of the Puerto co Aqueduct and Sewer Authority (PRASA).

## References

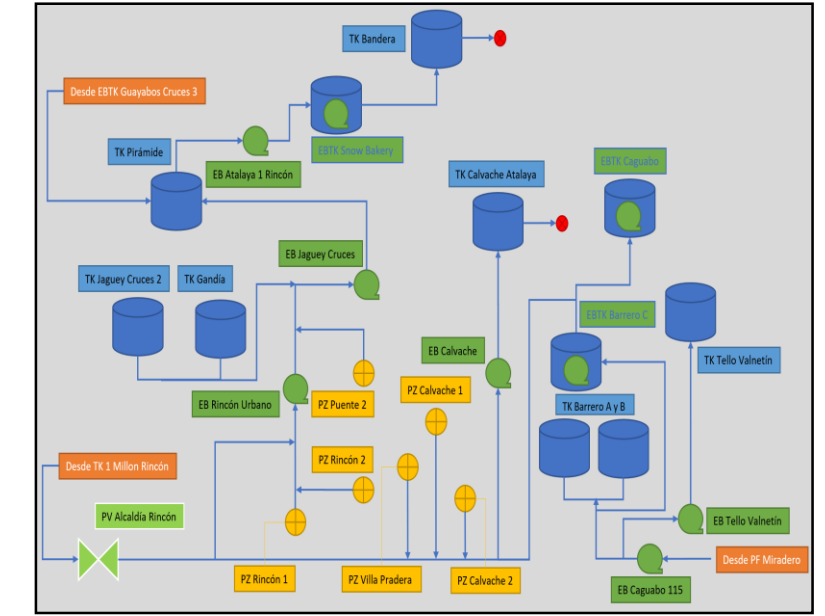
Acueductos y Alcantarillado de Puerto Rico, *Reglamento de Normas y Diseño de La Autoridad de Puerto Rico*, 1984.  
D. Savić, H. Mala-Jetmarova, N. Sultanova, "History of Optimization in Water Distribution System Analysis," presented at 1st International WDSA / CCWI 2018 Joint Conference, Kingston, Ontario, Canada, 2018.

## Water Distribution

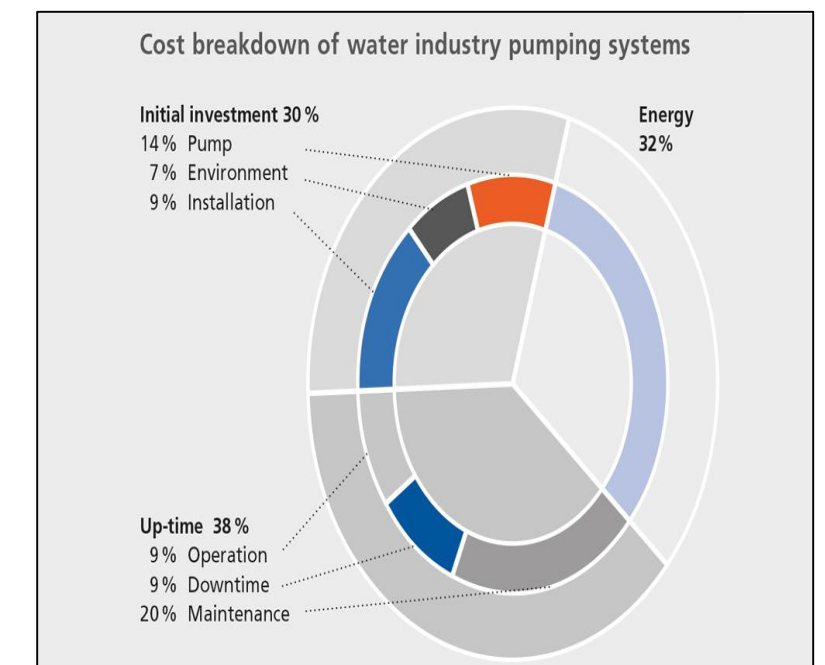
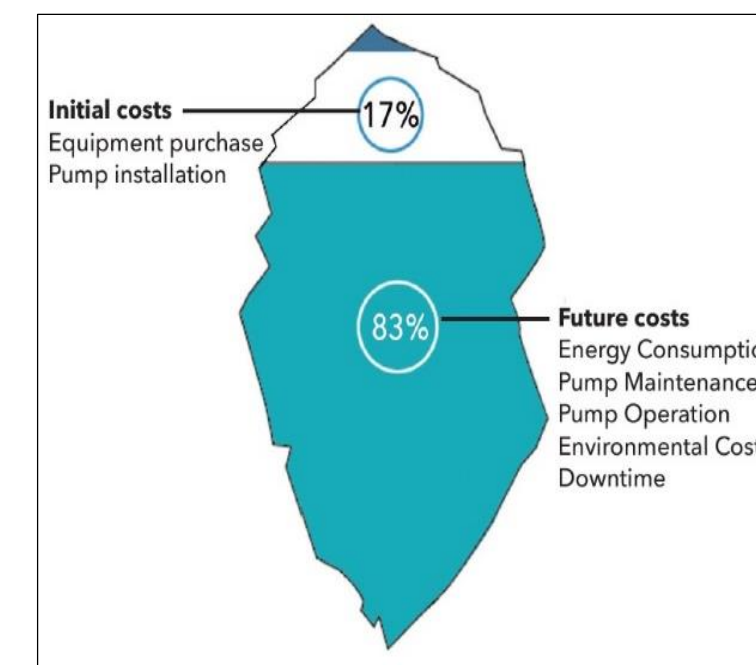
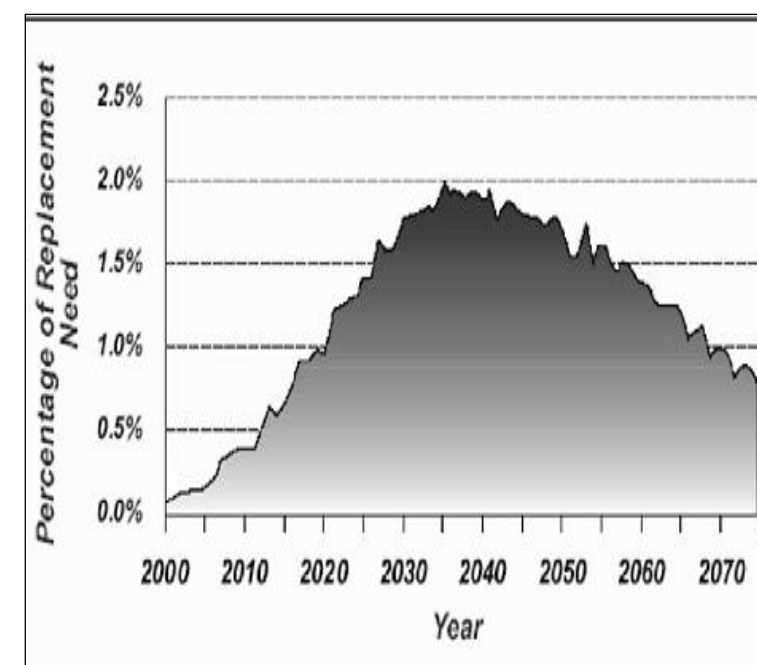


### The Safe Drinking Water Act (SDWA)

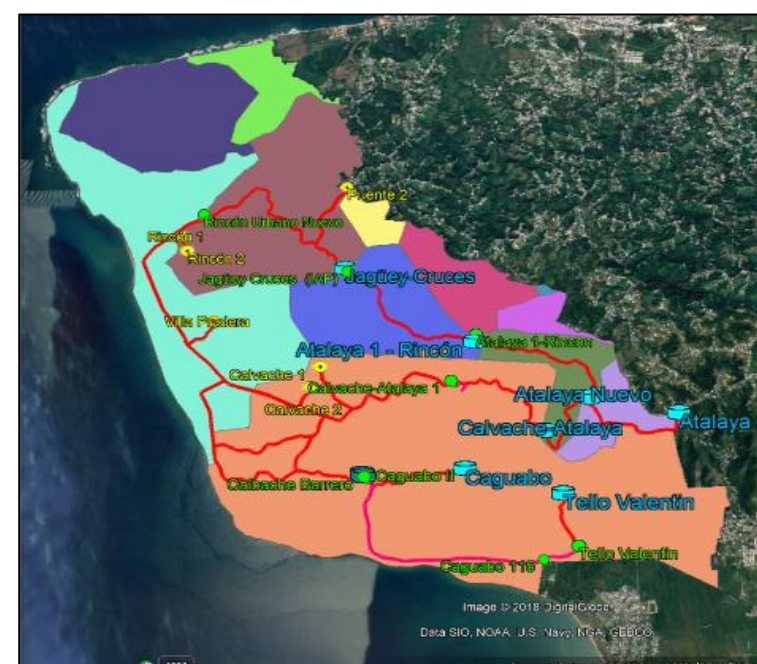
- Drafted in 1974
- Amended in 1986 and 1996
- Sets national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water
- The US EPA is responsible for regulation and enforcement by setting national standards for drinking water based on sound science to protect against health risks, considering available technology and costs.



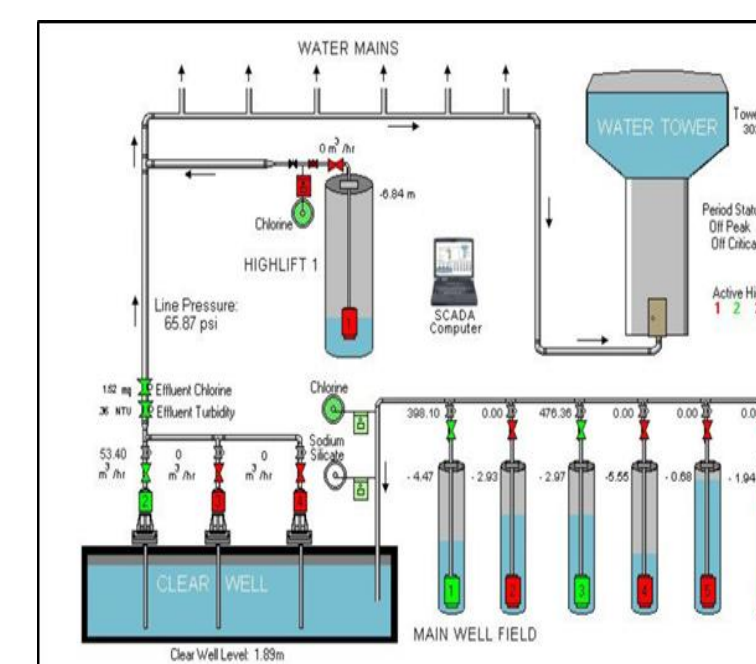
## Replacements



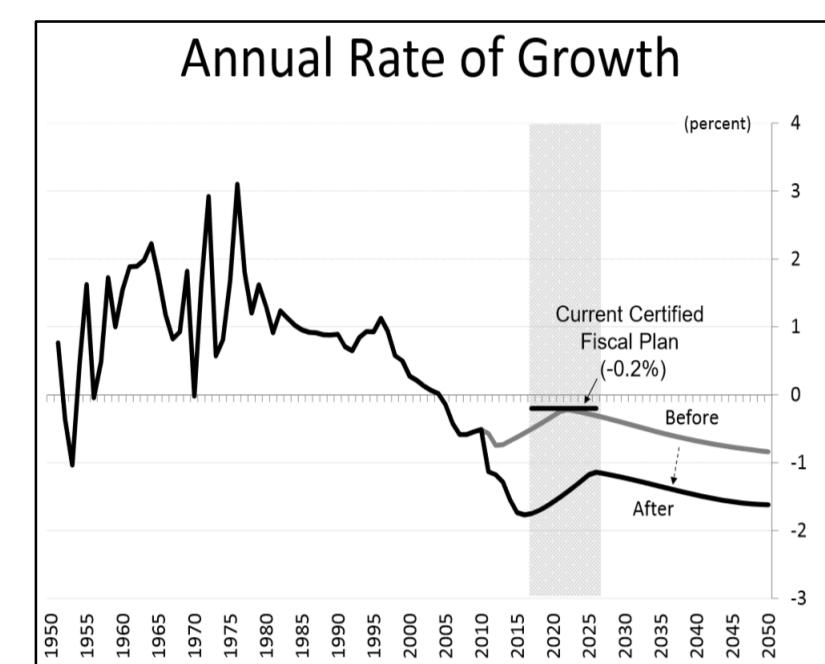
## Methodology



Geographical Information System (GIS)



Control and Data Acquisition System (SCADA)



Population Changes