

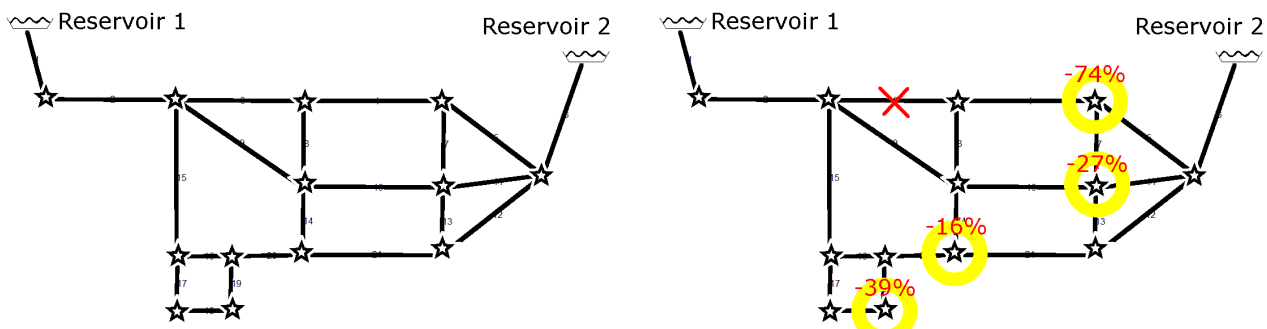
Master's Thesis - Environmental Engineering

Multi-objective decision support tool for monitoring and maintenance of water distribution systems

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Background

Supply of drinking water is one of the most valuable services in our modern society and the operation and maintenance of drinking water supply network can be very costly. The purpose of this thesis was to investigate the applicability of a decision support system based on Bayesian Network theory for maintenance decisions in a drinking water distribution network. Such a system could support the decision making process by introducing a systematic approach to the decision whether a drinking water pipe should be replaced or not.



*Left: Drinking water distribution network in normal operation
Right: Drinking water network with failure of one water pipe*

Methodology

To develop the decision support system at hand different values to estimate the failure probabilities of water pipes and the direct, as well as indirect, consequences of a pipe failure had to be obtained. These values were directly and indirectly derived from literature. Furthermore an integration of a suitable hydraulic modeling algorithm has been implemented using Matlab and EPANET in order to model the consequences the failure of a single pipe has on each point of the water distribution network.

Results

Due to a lack of data it was not possible to test the investigated approach for a decision support system on a real drinking water network. However the application on a simple case found in literature shows the approach produces plausible results. It has been shown that, given reasonable estimates for failure probability and failure consequences, the investigated approach is feasible. Furthermore several areas of investigation to improve the model in future work have been highlighted.

In cooperation with TÜV SÜD AG, Water Services

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