“If you can't measure it, you can't manage it” – intelligent sewer operation requires better information

Jörg Rieckermann

Swiss Federal Institute of Aquatic Science and Technology, Eawag, 8600 Dübendorf, Switzerland

joerg.rieckermann@eawag.ch

EXTENDED ABSTRACT

Initially built to safeguard public health, our sewers have grown into complex infrastructure systems. Although they fulfill complex goals from reducing the risk of urban flooding to protecting receiving waters from urban pollution, the monitoring of urban drainage systems is usually limited to water levels or discharge measurements at very few locations. Future climatic and societal changes, as well as the current economic decline and fiscal pressures, will force us to better achieve our goals with less resources. This requires us to work smarter in designing, maintaining and, above all, operating our drainage infrastructures to increase their adaptive capacity and avoid system overload and failure. To intelligently operate our systems, we need to obtain good data and reliable methods and models to transform this data into meaningful information. However, despite recent advances in telemetry, the required data often does not exist or is in the wrong scale. Often, this data is also incomplete or of dubious quality. Consequently, there is an urgent need to provide the data and tools to support the intelligent operation of urban drainage systems.

In this presentation I suggest to better observe and understand important hydrological processes by using novel information sources, such as microwave links from telecommunication networks, or fibre-optic distributed sensors. In addition, I will demonstrate how dedicated experiments with using artificial or natural tracers can be used to measure key system variables. Such experiments can also support the automated fault detection of monitoring devices or even the detection of system failures. Furthermore, I will motivate the use of model-based data analysis and advanced statistical techniques to better interpret monitoring data and learn from observations.

In my talk, I will present recent examples to improve the monitoring of important input variables for urban drainage modeling, such as urban precipitation and sewer infiltration, as well as system states and output variables, such as discharge and pollutant fluxes. I will furthermore discuss future challenges, which arise from distributed sensor networks, information security and the computational complexity of our models. Finally, I will discuss future opportunities, such as improving urban drainage system management with remote sensing information and assimilating data from very different sources, such as online sensors or social media.