MODELING IN A CRISIS: OVERCOMING THE WATER SECTOR'S DATA STRUGGLES TO REALIZE THE POTENTIAL OF HYDRAULIC MODELS

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ABSTRACT

Hydraulic models can provide an efficient and cost-effective tool for water utilities to respond to changes in operating conditions (e.g., population dynamics, natural disasters, public health emergencies) and thereby help increase system resiliency. Unfortunately, model development remains out of reach for many utilities due to high software costs, data needs, and personnel requirements. Further, hydraulic models' extensive data needs are often overlooked in technical modeling resources (e.g., textbooks, industry guides). Following the onset of the COVID-19 pandemic and the implementation of Social Distancing Policies (SDPs), a hydraulic model was developed to understand system vulnerabilities due spatiotemporal changes in water demands. The objectives of this study are to classify the data needs and processing stages of hydraulic modeling, identify success factors and challenges associated with model development, and demonstrate the relevance of a hydraulic model in a protracted crisis such as the COVID-19 pandemic. Results show that the developed model can offer useful insight for utility managers by identifying system vulnerabilities (e.g., stagnation). However, the widespread data collection and processing challenges encountered reflect significant barriers to model adoption in the water sector. Key challenges include siloed expertise and data collection efforts across utility departments, lack of data standardization, and lengthy data processing. The amount of time required to gather and process the necessary data shows that show model development cannot occur in the midst a crisis, because by model completion the crisis will have likely passed. Recommendations are made to address data-related challenges and support utilities in incorporating hydraulic modeling into Emergency Response Plans to ensure models are ready for use before a crisis occurs.

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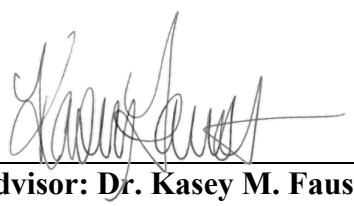

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