Analyze the mechanical resilience of urban water network systems through an interactive soil pipeline model assessment simulated under the impact of climate changes.

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Keywords: Urban infrastructure, Uncertainties, Digital transformation, Decision-making aid, Structural robustness, Resilience.

Abstract

The urban water network is one of the most important systems for the development of any city and sustains the normal functioning of any community. It plays a vital role in enhancing sustainability with the livability of urban environments and the resilience of cities to various challenges, just one malfunction or one failure in a small part of this system can lead to many negative consequences. For example, when water allocation capacity is affected by any various factors, including natural and unnatural, an imbalance in water supply and demand will occur as an inevitable consequence, which leads to another cascading effect of increased vulnerability to water shortages and droughts, increased costs and environmental damage. On the other hand, when water pressure and maintenance capabilities are lost for similar reasons, this will lead to further negative consequences when networks will suffer water leakages and will greatly affect people's lives, thus inevitably reducing the reliability, robustness and resilience of the city. Despite its long history through many stages of development, this system still has many difficulties even today. Nowdays, these aging structures are heavily influenced by world population growth and the unpredictable complexity of climate change, which poses a huge challenge from the terrible natural phenomena that lead to the deterioration of urban infrastructure and reduce its resilience, making those challenges increasingly worse. In the digital transformation revolution taking place in every sector, urban infrastructure is no exception. Therefore, this is a great motivation for research on a tool to evaluate the mechanical resilience of simulated urban water infrastructure under the impact of climate change.