Computational Automation for Water Security

Enhancing Water Quality Management

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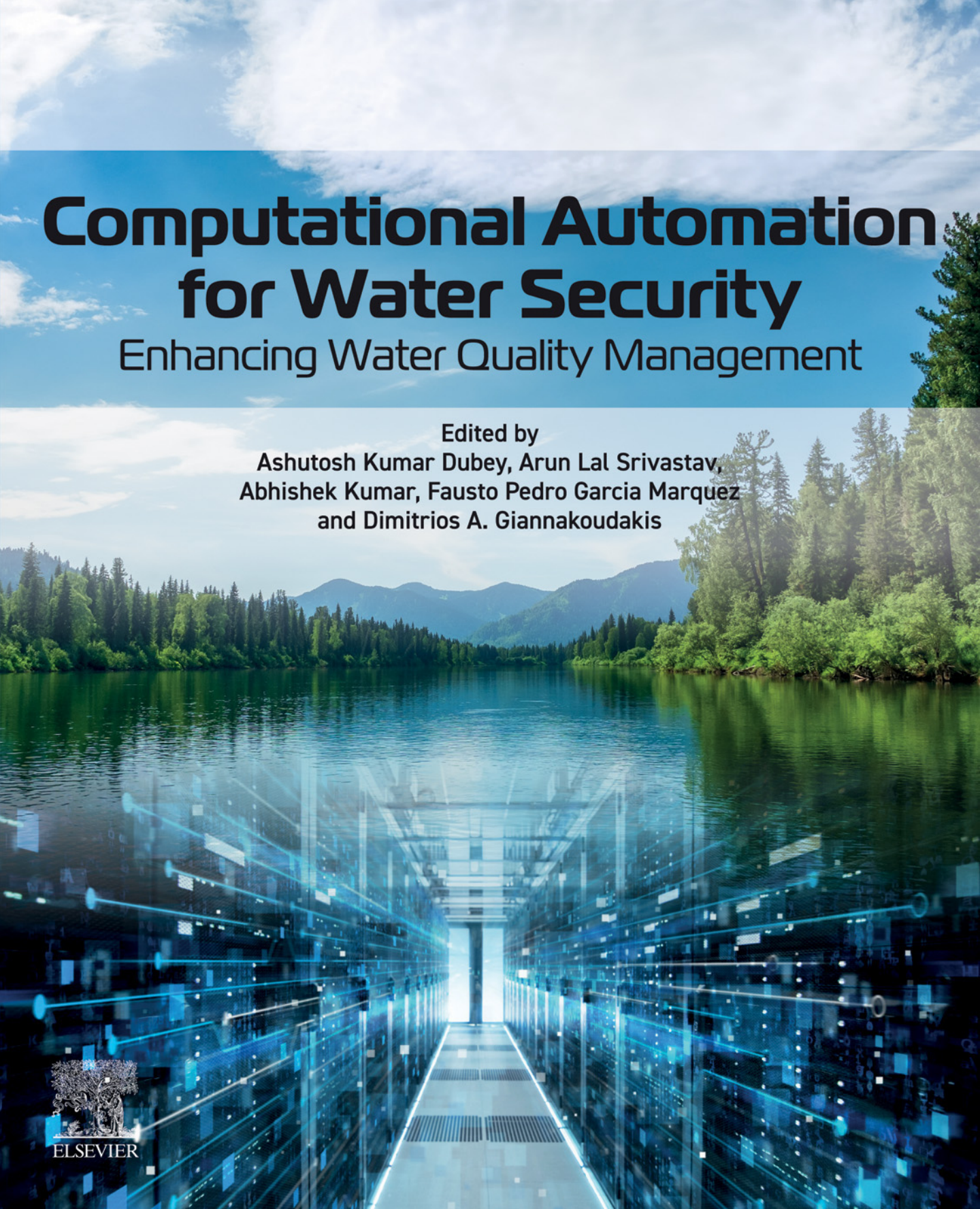

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CHAPTER 8

Empowering water security: the synergy of automation and IoT integration

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8.1 Introduction

Water security is a paramount global challenge, intricately linked to sustainable development, public health, and environmental preservation (Dell'Angelo, D'Odorico, & Rulli, 2017). As populations burgeon, climate change accelerates, and urbanization intensifies, the imperative to ensure reliable, safe, and equitable access to water resources has never been more pressing. In response to these complex challenges, the integration of automation and the Internet of Things (IoT) has emerged as a transformative approach to water management, promising to revolutionize how we monitor, manage, and safeguard water systems (Chen, Wu, & Ahmadi, 2022).

The background and context of this critical review delve into the evolving landscape of water security and the pivotal role of technology in addressing its multifaceted dimensions. Traditional water management approaches often face limitations in terms of real-time monitoring, predictive capabilities, resource optimization, and infrastructure resilience (Guna Priya, 2023). Integrating automation and IoT technologies offers a paradigm shift by enabling continuous data collection, advanced analytics, predictive modeling, and automated control mechanisms. This context sets the stage for understanding the significance and potential impacts of integrated automation and IoT solutions in empowering water security (Sharida, Hamdan, & AL-Hashimi, 2020).

The primary research objectives of this critical review are twofold. First, to comprehensively evaluate the benefits, challenges, and future prospects of integrating automation and IoT technologies in water security. This entails examining the potential impacts on real-time monitoring, data-driven decision making, resource optimization, infrastructure resilience, and safety measures within water systems. Second, to provide actionable insights, recommendations, and best practices for stakeholders, policymakers,

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