



Water

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Special Issue Reprint

Machine Learning Applications in the Water Domain

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Machine learning is reshaping how we understand and manage water systems, yet real-world adoption remains uneven across different operational contexts. This Reprint brings together applied research that goes beyond theoretical benchmarks to address pressing challenges faced by engineers and water managers. It collects over a dozen recent studies in key areas such as water quality prediction, reservoir operations and flood control, dam safety and spillway erosion, groundwater level estimation, evaporation from reservoirs, vegetation mapping from drone images, surge protection in pipe networks, and the optimization of cascade reservoirs. These are practical problems where traditional models often struggle, and machine learning offers a real alternative—it is better at handling non-linear behavior, noisy data, and real-time decisions. The value of these papers is that they do not just test algorithms on clean datasets; they tackle real engineering challenges with methods like deep learning, reinforcement learning, and transformers. Taken together, the Reprint shows where machine learning is already making a difference and where gaps are still present. Looking ahead, the field needs to focus on making models more interpretable, combining them with physical knowledge, and putting them in actual operation rooms. This collection gives researchers and practitioners a solid snapshot of where we stand.



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