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Enhancing Decision Support through Hydrological Modeling and Scenario-Building: A Case Study in the Brantas River Basin, Indonesia

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Water managers and planners working within complex social-environmental systems are challenged with difficult choices when prioritizing interventions to manage water quality and reduce pollution from point and non-point sources. These choices are particularly important in low-resource environments where public funds must be carefully allocated. To support policy analysis for water quality management, a water quality modeling and policy consultation exercise was performed by Deltares, TU Delft, and government partners in the Brantas River basin, East Java, Indonesia. The modeling exercise combined mapped pollution source estimates for domestic wastewater and agricultural runoff with rainfall-runoff and pollution transport and fate models to demonstrate estimated impacts of various source-reduction scenarios on BOD loads along the main river. These outputs were used to inform deliberations regarding options to reduce water pollution and improve river health at a basin level. The model's ability to identify hotspots and assess the impact of targeted pollution reductions offers a powerful visual tool for policymakers to formulate geographically targeted interventions and identify the specific pollution source reductions that would yield the most substantial improvements. The case demonstrates the practical applications of scenario-building as an invitation for policy-makers to visually consider alternative interventions and focuses on lessons learned regarding capacities required to perform such activities, stakeholder engagement to build workable and meaningful model from an administrative perspective, and practical considerations for applying data-driven approaches to prioritization.