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## Coproducing a water quality dashboard: Data communication for decision support in the Brantas River basin, Indonesia

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Interconnected processes of IWRM demand involvement of many stakeholders negotiating a variety of competing interests and goals in agenda-setting, formulation, implementation, and evaluation. These processes – and the decision taken therein – naturally involve a wide variety of data inputs. But in many contexts, available data are partial or analytically insufficient; utilization is low due to inattention to user needs; key data are not readily available; or generated evidence is scientifically rigorous but poorly matched with the most relevant policy questions. These conditions nudge policy systems towards “knowledge creep,” “decision accretion,” and “policy layering.”

The participatory turn in water governance presents an additional set of opportunities and demands. Committees, consultative groups, coordinating bodies, and citizen science programs engage a broad array of actors in knowledge co-production and consumption for water resource decisions. Expansion of the knowledge and decision network introduces valuable new data but also new considerations regarding the use of data, practicalities of data aggregation, and how data should be combined and disseminated to meet various user needs and minimize “information overload.”

This research examines how standard chemical water quality data, participatory citizen science outputs, and other qualitative data are currently used in policy decisions regarding water quality management in the Brantas River Basin in Indonesia, where decisions are undertaken in highly consultative settings. Initial findings via interviews with key users suggest that there is space to extend the use of scientific data and citizen science outputs for decision support and public information. Chemical water quality data is considered legitimate yet partial, not easily interpreted by decision-makers in tabular form, and insufficient to inform some policy decisions, including those related to solid waste and industrial pollution. Citizen science outputs, on the other hand, are recognized to serve important educational purposes but are not actively used to inform policy. Moreover, water quality conditions are not immediately apparent to decision-makers and citizens with respect to seasonal fluctuations and variations across the upper and lower reaches.

This exploratory study also tests a co-productive approach to constructing, testing, and revising a digital Water Quality dashboard to improve the uptake and interpretability of data, identify data gaps, and offer decision-makers and other stakeholders a usable overview of conditions. The iterative process involves systematic and participative appraisal of decision support needs and constraints; collation of disparate hydrologic data sets to test integration and visualization alternatives and identify sampling gaps; inclusion of citizen science and textual data; and testing of visualization and dissemination alternatives for various uses. Citizen-science data will include water quality and biomonitoring data, micro-plastics analysis, and geo-tagged data on sources of pollution. Data dissemination alternatives are to be iteratively evaluated and revised based on criteria of policy and educational relevance, interpretability, and feasibility of data maintenance.