

Knowledge was power; now data is. Case studies of water resource development in Latin America

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Sharing knowledge through training, education, and building local capacity are essential ingredients for improving access to water resources. Large datasets are one form of knowledge today, and should be considered in water resource development.

The people who have access to and control of underlying data and statistical summaries thereof have the power that comes with a big picture perspective gained by that perspective. Columbia Water Center (CWC) research on water risks related to mining in the U.S. and Peru has found that mines have extensive environmental data, but disclose relatively little even to governmental regulating agencies. This limits the ability of the government, nearby populations, and other institutions from making appropriate watershed level decisions for remediation and water use allocation. Data generation and statistical analysis, when made widely accessible, can contribute to environmental justice and resource equity. Approaches to support this include participatory data gathering, in-situ testing, emerging technology for water testing and environmental monitoring, development of open-source databases, and training to understand results of water analysis and statistical trends.

These approaches are being implemented in a CWC project in a coastal town of Peru to develop best practices in combining field measurements, community engagement, and remote sensing. The region recently suffered major flooding, so data measurements and data-related capacity building are considered in the context of climate-related disasters. We found that water measurements and interest in environmental monitoring, which promotes long-term sustainability in water use, naturally declined after the disaster. Data-gathering systems that are resilient to natural variability provide more power to posterior analyses.

In the Bolivian Altiplano, a data-based approach improved access to water and led to more sustainable infrastructure and management practices. The typical training for water managers was regional conferences on how to set, collect and track fees, save for capital costs, and conduct maintenance. However, one regional government didn't just train, but first assessed. They started an initiative in 2013 to gather data on each town's capacities, water use, and access to resources. Supported by that database, the regional conference was an opportunity to settle transboundary water disputes, strategically allocate resources, and assign partner non-profits and development agencies to specific projects. All water-related development work has been tracked and documented since then, creating long-term accountability and eliminating duplication of efforts. As this regional pilot program is expanded elsewhere in Bolivia, coordination between municipalities may expand beyond joint conferences to share lessons learned, but also joint databases for comparison of water-related data. Likewise, training must look different today. Rather than simply explaining concepts, water users and managers can benefit from continual access to information (e.g. through knowing how to do online searches, how to develop a database, and how to respond to test results). All types of knowledge- indigenous knowledge,

modern era technology and systems, and twenty-first century “big data” approaches- have distinct roles in improving the use of water resources.