



# Internet of Water

The Internet of Water (IoW) envisions a world engaged in sustainable water resources management and stewardship enabled by open, shared, and integrated water data information.

The mission of the IoW is to build a dynamic and voluntary network of communities and institutions to facilitate the opening, sharing, and integration of water data and information. The network will connect data producers, hubs, and users to make water data more findable, accessible, interoperable, and re-usable.

## Why an Internet of Water?

All too often, decision-makers are unable to answer fundamental questions about our water systems in a timely manner:

- How much water is there?
- What is its quality?
- How is it being used?

The data needed to answer these questions often exist, but it is collected by multiple agencies across different scales of government and non-governmental organizations for different purposes. Since data are scattered across multiple platforms with different standards, much of it cannot be re-used beyond the primary purpose for which it was collected. Moreover, it is difficult and time consuming to transform that data into information that supports decision-making.

## What is the Internet of Water?

The Internet of Water (IoW) is a project currently housed at Duke University's Nicholas Institute for Environmental Policy Solutions, managed by a small startup team and supported by grants from several philanthropic organizations. In 2016, the Aspen Institute collaborated with the Nicholas Institute and the Redstone Strategy Group to convene a dialogue with diverse stakeholders to discuss what barriers exist and what steps are needed to improve the nation's water data infrastructure. That dialogue led to the publication of the 2017 report: "The Internet of Water: Sharing and Integrating Water Data for Sustainability," a bold vision for how to improve water data infrastructure nationwide to fundamentally transform water management.

For more information find and follow us here:

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## A simple illustration of the problem...

Many water managers—whether in the public, private, or NGO sectors—find themselves spending 80% of their time finding and cleaning data and 20% actually putting data to work for decisions. A simple illustration of the problem: it is easier to find out what the traffic or weather is in Beijing, Berlin, or Mumbai than it is to find out how water customers react to weather patterns, water prices, and conservation programs within a local metro area. Those data are collected, but they aren't available or being most effectively utilized.

The IoW is focused on transforming the availability and use of water data and information.

To address these challenges, the nation requires a 21<sup>st</sup> century water data infrastructure with new technologies that enable data to flow seamlessly between users while generating information for real-time management to meet our growing water challenges. **The IoW is the vehicle for transforming these ideas into reality.**

## Technical Approach and Common Tools

The IoW is creating a variety of open-source common community resources designed to promote adoption of open water data best practices nationwide. These resources are intended to allow efficient use of existing data, particularly public, governmental data. They will be created by Duke personnel in collaboration with technical experts at the Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUAHSI) and the Water Data Exchange (WADE) of the Western States Water Council. Common tools include a series of glossaries, catalogs, and educational materials, along with recommended best practices:



Just as the internet itself began with a community-wide standardization of how data would be catalogued, so an internet of water needs to begin with community-wide standardization and cataloguing.

- Glossaries of controlled vocabularies related to water will be established from federal and state agencies and homonyms, synonyms, and definitions linked together.
- Catalogs will be created for water data standards, metadata standards, and different types of water data
- Educational materials include in-person trainings, tutorials, and handbooks
- Best practices will be developed for long-term operations and maintenance of cloud services, and conceptual approaches to building common data models for water quality and water quantity, including for water budgeting

## Value Demonstration: IoW Pilot Projects

In addition to the common tools, the IoW will engage with leaders and stakeholders in several states to consider implementation of one or more pilot projects designed to demonstrate the value of open data. IoW pilot projects are by definition stakeholder intensive and require extensive collaboration among producers, hubs, and users of water data. The benefits derived from pilots that address real and existing challenges will enable stakeholders to better articulate the value of investing in water data and participating in the development of the IoW. As such, pilots are a critical component of quantifying the benefits of open water data, garnering political support and investment, and building the case for and creating momentum around the IoW.