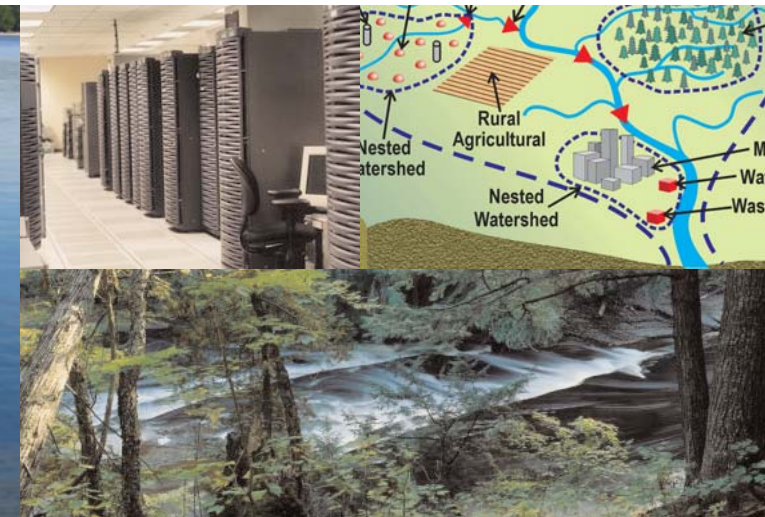




WATERS NETWORK

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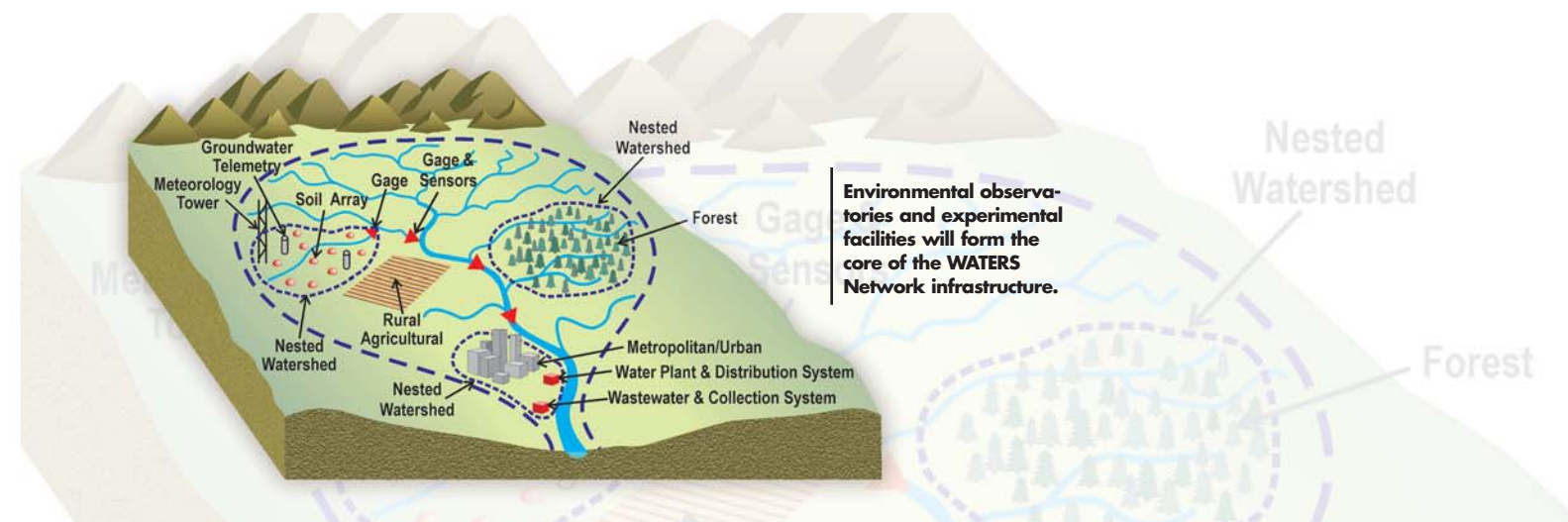
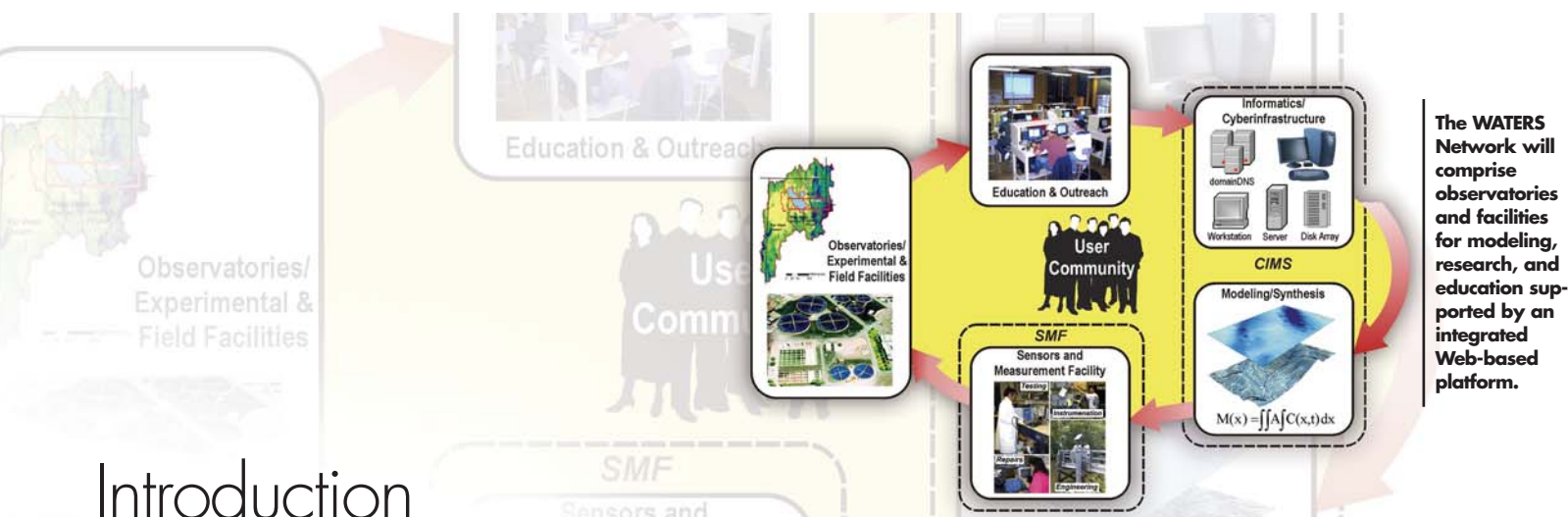
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**The WATERS Network: A bold, new initiative that will transform the way we understand and protect our Nation's waters.**



# Introduction

**The WATERS Network: A bold, new initiative that will transform the way we understand and protect our Nation's waters.**

The WATERS Network is designing a national capability to better predict and manage the behavior of water—and its nutrients, contaminants, and sediments—everywhere in the U.S.

Human activities are changing the environment at unprecedented rates. Growing and wealthier populations, increasing urbanization, and climate change are tipping the balance between water supply and demand and magnifying the challenge to live sustainably with our water environment.

Pollution and degradation of our nation's waters continue to defy solutions with existing approaches. Wetlands have been drained, intensive agricultural practices have drastically increased nitrogen levels, and dam construction has altered the flow of rivers and streams, affecting entire ecosystems.

U.S. population growth increasingly is concentrated near coastal areas and arid regions, affecting not only quantity, but quality of water available. Sediment from erosion due to development has had long-lasting effects on water quality. Demand for fresh, clean water keeps increasing, yet we know little about how much is available in aquifers that serve about 46% of the population.

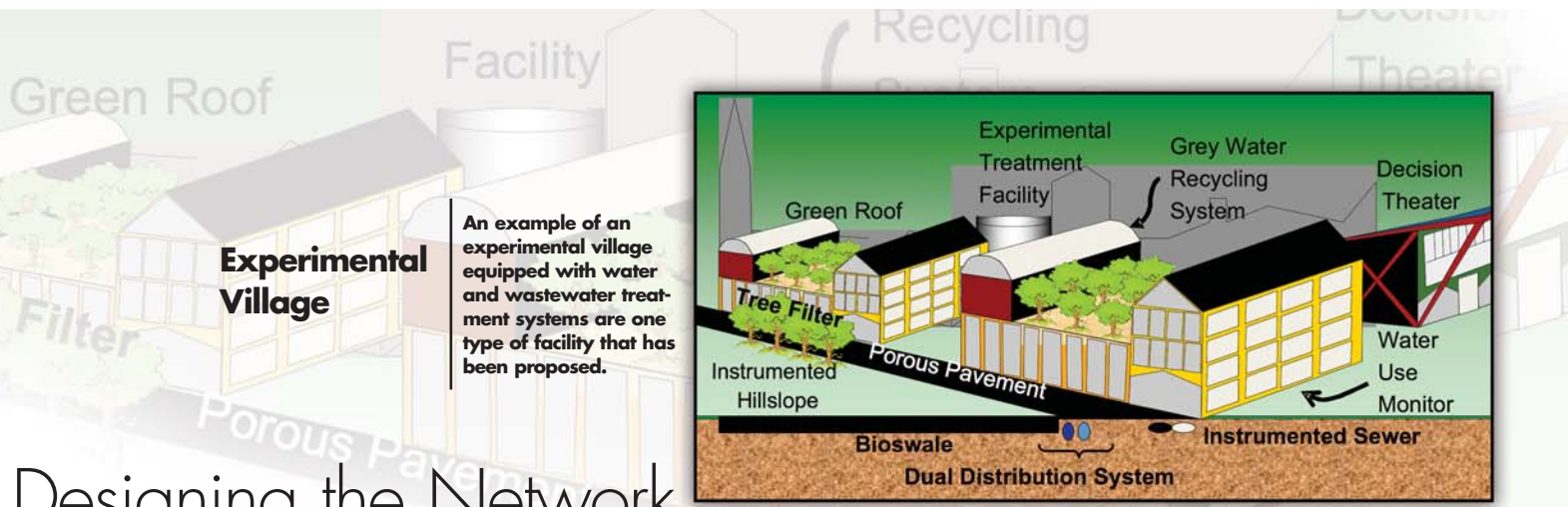
We also know little about how the water environment is being affected by human impacts or how existing systems can adapt to meet future challenges. Current water resource management relies on theory developed under controlled conditions in the lab and field, generally from a narrow disciplinary perspective. Management of water quantity for flood control and irrigation comes from statistics on historical data and does not account for changes in land use or climate.

We need real-world information and multidisciplinary knowledge on the coupled processes linking humans and biota to the natural and engineered water environment. Only with this knowledge can we make critical decisions needed to effectively manage our water and protect both humans and ecosystems.

There are several ways the WATERS Network will develop the scientific understanding needed to address these issues through more effective land and water resource management. It is envisioned that the Network will enable:

- Better prediction of droughts and floods, and how they will impact water supply and quality.
- Assessments of how human development—such as land use, urbanization, agriculture—are affecting the flow and quality of water and impacting water bodies.
- Improved understanding of how people learn about and make decisions regarding the environment.
- Restoration of streams based on accurate information from natural, managed, and human-influenced systems to meet goals to improve water quality, quantity, health safety, and ecosystem function.
- More accurate estimates of volume of natural water sources to support sound decisions as water becomes an increasingly valuable commodity.
- Decision-making tools to address issues of water management in times of drought and flooding, and prevention of pollution from farms, suburban and urban landscaping, and transportation systems.





**Experimental Village**

An example of an experimental village equipped with water and wastewater treatment systems are one type of facility that has been proposed.

## Designing the Network

The WATERS Network will consist of tightly integrated observational and experimental facilities that can measure and collect data and provide analysis, modeling, and visualization of water systems on a level that is not currently possible. The facilities will be structured to collect systematic and comparable data.

Information will be linked by a single, powerful cyberinfrastructure that will allow for an unprecedented level of collaboration between scientists, engineers, government, students, and citizens throughout the United States. This Web-based network will allow researchers from a range of disciplines to collaborate on investigations of complex natural ecosystems and will provide:

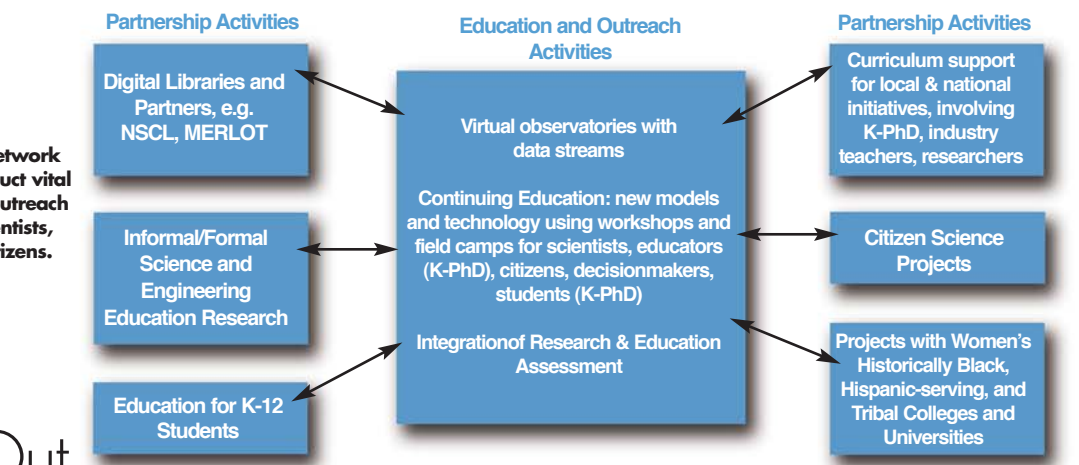
- Critical information on all types of water systems.
- Direct, real-time access to streaming data for experiments.
- Easy-to-use analysis tools to better understand these data.
- Sensors and measurement facilities that support the network of field research.
- Visualization tools that allow for accurate natural and managed system modeling.
- Interactivity so that researchers can collaborate and share community data.
- Synthesis and modeling support services.

The Network will facilitate development of partnerships with federal, state, and local agencies by leveraging existing data and facilities. These partnerships will enable cross-disciplinary research to solve real-world problems.

A level of adaptive management of research that is not currently possible likely will emerge. For example, using the WATERS Network, a scientist will be able to alter the frequency or type of data being collected for an experiment happening across the country simply by entering a few key strokes on his or her desktop computer. Students or citizens may be able to manipulate sensors, such as cameras, to better observe events of interest, such as sediment flow in a river during a storm.

Each WATERS Network facility will conduct vital education and outreach activities for scientists, students, and citizens.

## Reaching Out



Education and outreach will form a key component of the WATERS Network, nurturing upcoming scientists and engineers and providing a hub for national partnerships with grass roots and citizen-based organizations.

Each observatory will conduct workshops and camps that will provide education for students, teachers, and the public. An intuitive, powerful, Web interface will allow students and citizen scientists to contribute data to ongoing studies from across the Nation. Environmental engineers and scientists from water and earth and social, behavioral, and economic sciences will collaborate virtually to conduct innovative research.

The resulting knowledge will lead to more scientifically informed choices by students, public figures, and citizens—all of whom need to be engaged in solving our environmental problems. This effort also will help to train the next generation of scientists, who will have a more holistic understanding of the Earth's systems and be better prepared to address our nation's complex water challenges.

The WATERS Network has the potential to forever change the way students, scientists, citizens, and public officials learn about and solve water challenges and implement solutions.

An example of a dashboard for a digital watershed summarizing conditions in Corpus Christi Bay and a virtual meeting at a bay in Second Life (right).



## Getting Started



We must all learn how to live sustainably within a changing water environment that is no longer subject to natural forces alone but is now a function of both natural and human affects. To live sustainably requires an understanding of how our water systems respond to changes in climate and other human activities so that we can safeguard and manage our resources.

The WATERS Network will improve our understanding of how natural processes and human activities affect the water environment so that we can better predict and manage our water resources. It also will enable more effective sharing of knowledge with the public and government officials, so that they can make more informed choices regarding water-related issues.

The WATERS Network is currently in the conceptual design stage. Once this stage has been completed, we will begin work on final design and planning. We anticipate launching the completed network by 2016, transforming how we as a nation protect our most precious resource - water.

For more information on the WATERS Network  
visit <http://www.watersnet.org> or  
send an email to [watersinfo@ncsa.uiuc.edu](mailto:watersinfo@ncsa.uiuc.edu).



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