Julie Ann Wrigley Global Futures Laboratory™

Arizona State University

Arizona Water Innovation Initiative

Strengthening Arizona's water resilience through technological developments, partnerships and applied research.

azwaterinnovation.org

Water security for a thriving Arizona

Driving a thriving water future through discovery, innovation, and action for the benefit of all of Arizona.

Julie Ann Wrigley Global Futures Laboratory

Arizona State University

Arizona Water Innovation Initiative

Accelerates the work ASU is doing in water: engineering, hydrology, law, policy and management.

Technological developments, partnerships and applied research.

Julie Ann Wrigley Global Futures Laboratory
Arizona State University

Arizona Water Innovation Initiative

Strategy Team

Dave White - Chair
AVP KE & Director,
Global Institute of Sustainability and Innovation

Jay Famiglietti
Professor
School of Sustainability

Sarah Porter
Director,
Kyl Center for Water Policy

Matthew Hulver
Vice President of Research Knowledge Enterprise

Enrique Vivoni
Fulton Professor,
School of Sustainable Engineering and the Built Environment

Paul Westerhoff
Regents Professor,
School of Sustainable Engineering and the Built Environment

Amber Wutich
President's Professor,
School of Human Evolution and Social Change

Susan Craig
Program Director,
Global Institute of Sustainability and Innovation

Claire Lauer
UX Architect & Professor,
School of Applied Professional Studies

Arizona Water Innovation Initiative

Global Center for Water Technology

This center seeks to discover and demonstrate scalable solutions for industrial, municipal, and agricultural sectors throughout the state of Arizona. The Global Center for Water Technology aims to produce tangible results – including inventions, patents and related startup companies, plus develop and support the following field–scale testbeds.

Advanced Water Observatory and Decision Support System

This initiative revolutionizes water measurement, modeling and prediction and provides data necessary to identify critical risks, vulnerabilities and capabilities in hydrologic systems.

Impact Water - Arizona

This program catalyzes community understanding and engagement in Arizona's water challenges and potential solutions. It includes five integrated workstreams focused on policy impact, inclusive engagement, science and technology translation, immersive experiences and water futures.

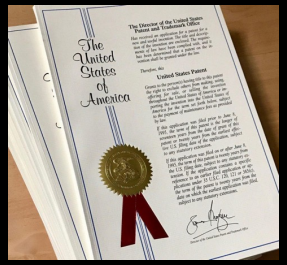
Arizona Water for All

This program works with Arizona's most water-insecure households to improve water security and engagement in water decision-making using community-based participatory approaches.

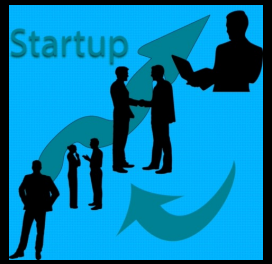
Policy

Inventions

Patents



Startups



Paul Westerhoff
Regents Professor, School of Sustainable Engineering and the Built Environment

Innovative technologies to improve water quality

Efficient fit-for-purpose water quality solutions

New renewable water resources

Focus on largest economic sectors in AZ

Help start-ups navigate challenges & increase chances of success

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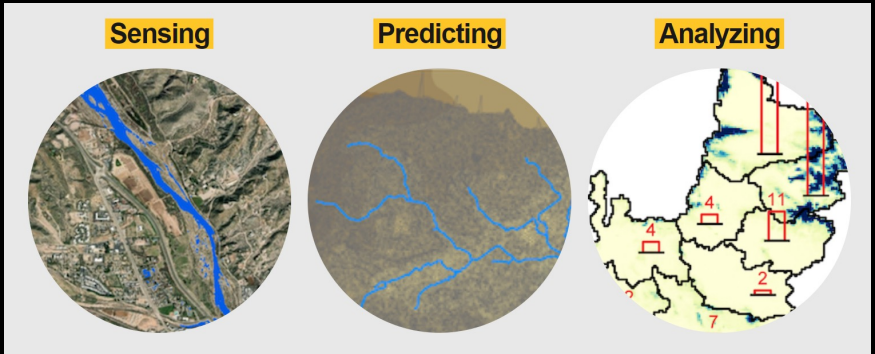
ASU Arizona State University

Center for Hydrologic Innovations



Measuring water in new ways

Modeling and prediction

Data and visualizations

- Inform short-term water decisions
- Plan for alternative water futures

Mission Control (decision support infrastructure)

- Earth observing systems
- Big data analytics, visualization
- Artificial intelligence

Jay Famiglietti
Professor
School of Sustainability

Enrique Vivoni
Fulton Professor,
School of Sustainable Engineering and the Built Environment

Advanced Water Observatory and Decision Support System

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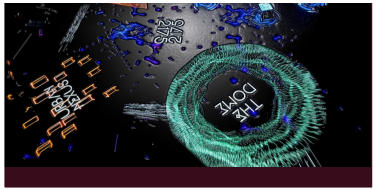
Translate | Engage | Empower | Activate

Project Cities

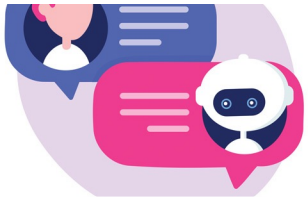
Drylab Challenge

Weathering the Storm

Water XR Game



Water Chatbot 1.0



Voter-Driven Change

Susan Craig
Program Director, Global Institute of Sustainability and Innovation

Claire Lauer
UX Architect & Professor, School of Applied Professional Studies

Impact Water - Arizona

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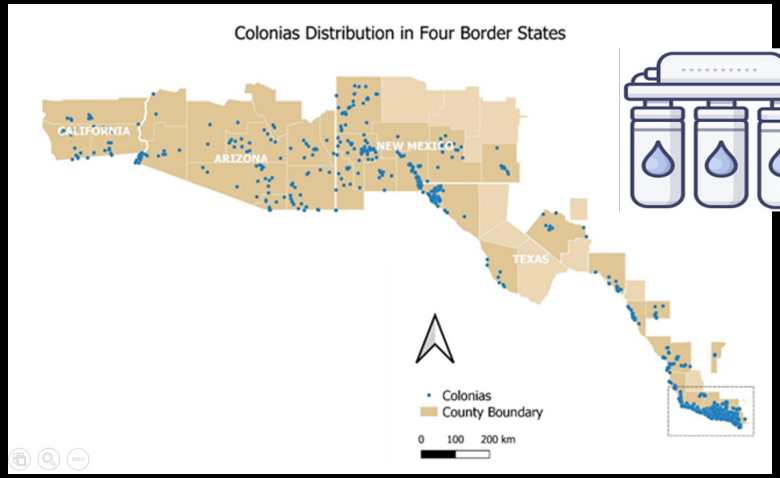

Amber Wutich
President's Professor,
School of Human Evolution and Social Chang

- **Developing water quality technology**
- **Using machine learning to understand water access inequality**

Arizona Water for All

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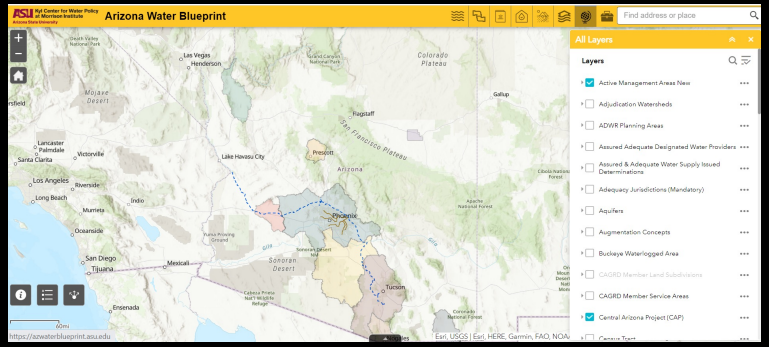
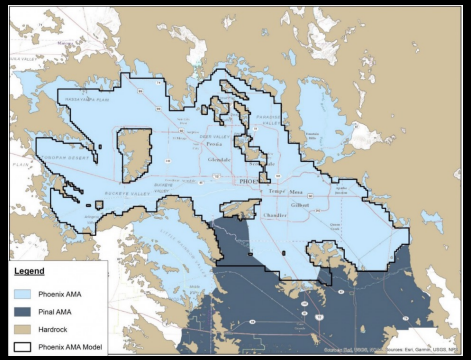


Water policy governs management, allocation and conservation

- Align future demand with supply
- Focus on policy leverage points
- Embed policy in decision-making processes
- Ensure practical solutions



Sarah Porter
Director,
Kyl Center for
Water Policy

Kyl Center
for Water Policy
at Morrison
Institute

Arizona State
University

Policy

AWII Kick-off Event

From The Top

We must come together

Not an academic exercise

Find ways to stimulate innovation

Themes From Panelists

Communication & translation

Lack of institutional constraints

Convening ability

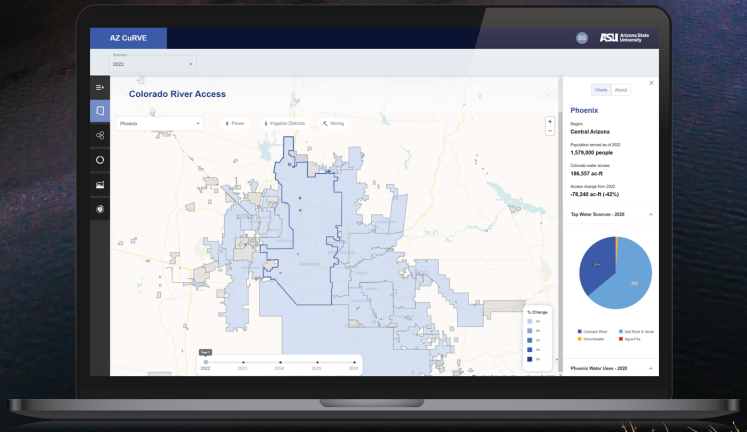
Need for a State Water Roadmap

ASU has a strong & growing water community partner network

Driving success through partnerships & establishing translation pathways

Highlights so far…

AZ CuRVE



The Arizona Colorado River Visualization Enterprise (CuRVE) is an interactive tool that enables users to explore Colorado River shortage impacts under differing hydrologic and management scenarios.

The CuRVE shows how community water systems, agricultural districts, tribal communities and industries may be impacted across multiple years.

Colorado River Basin (CRB)-Scenario-Explorer

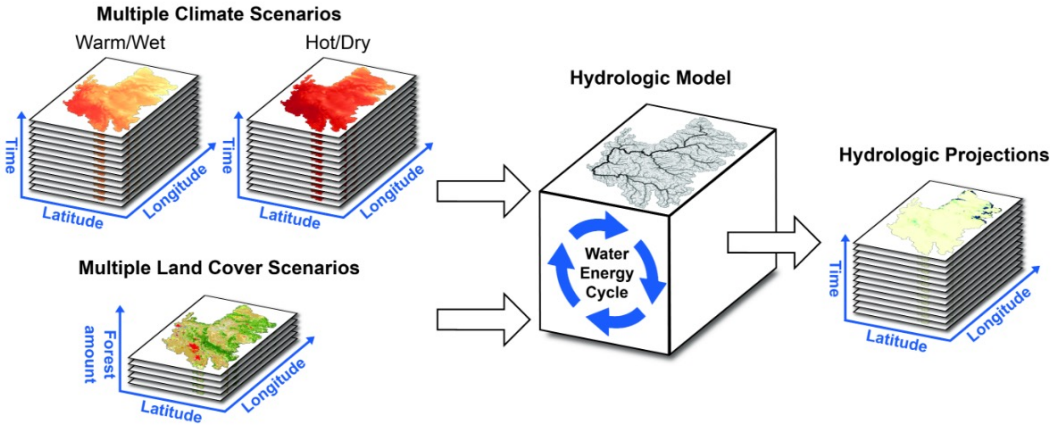
Interactive tool

Partnership

Technical tool for CAP & AZ water managers

Explore model scenarios of future Colorado River Basin hydrology

Evaluate sensitivity of flows to land use and climate change



Streamflow Determination from Remote Sensing Imagery

Utilized by Arizona Department of Environmental Quality

Standards of operation for Hassayampa River and Agua Fria River

Part of jurisdictional determination of flow status

Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

Accelerating tech transfer

Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Streamflow Determination from Remote Sensing Imagery

The streamflow regime is a critical determinant of many ecological and hydrological processes and plays an important role for regulatory purposes. Three regime categories are often used to describe a river reach: perennial, intermittent, and ephemeral. This distinction has important consequences for water resource management, e.g., since the Clean Water Act uses the streamflow regime characteristics for imposing regulations on pollutant discharges and maintaining water quality in rivers. And, protecting intermittent rivers and ephemeral streams (IRES) is critical since they provide valuable ecological and hydrologic functions. Additionally, there is a significant challenge for local agencies to determine jurisdictional status of IRES.

Current efforts to determine streamflow status include the use of streamflow gaging stations, ground-based cameras, field inspections by staff, biological indicators, and citizen reporting. All these methods share limitations of having low spatiotemporal sampling, limited access to privately owned lands, and difficulty in obtaining data covering vast areas. To overcome these limitations requires a spatial-explicit, large-scale observation platform that captures the flow presence in rivers and/or streams across any time period.

Researchers at Arizona State University have developed an algorithm for predicting the presence of water and streamflow regime in rivers and streams at high spatial and temporal resolution. With remote sensing datasets, this method can detect the presence of water in a channel and map the streamflow regime at any place(s) along the river or stream. The algorithm is robust and can be applied to arid and semi-arid rivers or streams with ease and at a low cost.

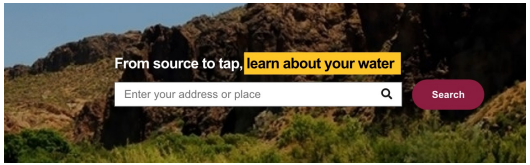
Additionally, this algorithm can be applied to detect other rapidly varying phenomena from remote sensing imagery. This could include monitoring and mapping agriculture, forestry, grazing, infrastructure, natural disasters, and maritime and coastal areas.

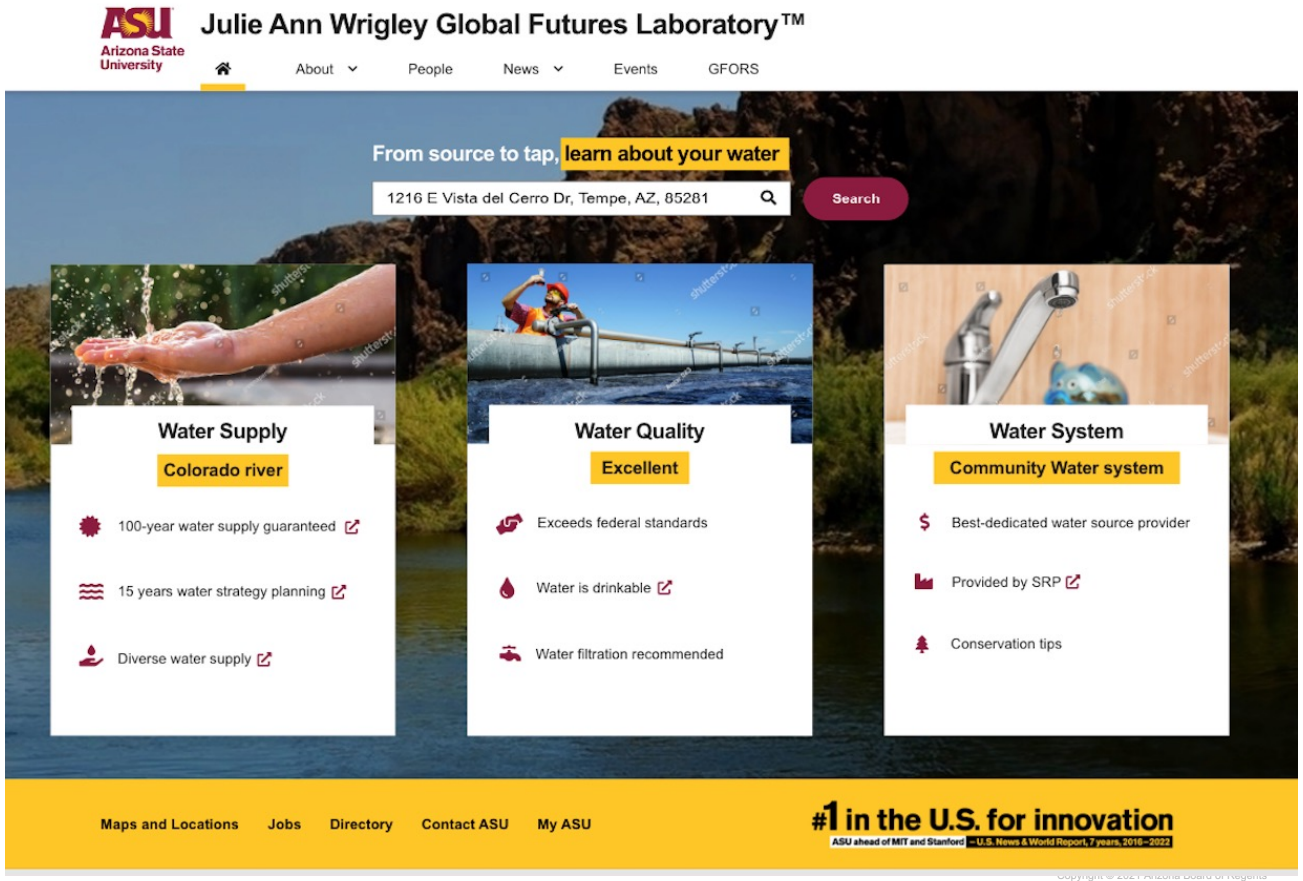
Potential Applications:

- Detect varying phenomena from satellite imagery for:
  - Streamflow regime determination – intermittent versus ephemeral
  - Crop growth mapping – track irrigation water use, monitor crop health, predict yield
  - Forestry management – determine areas affected by thinning, fire, disease, etc.
  - Grazing management – design rotation plans
  - Natural Disasters – determine affected versus nonaffected areas

Community Impact

About My Water





Integrated Water Model

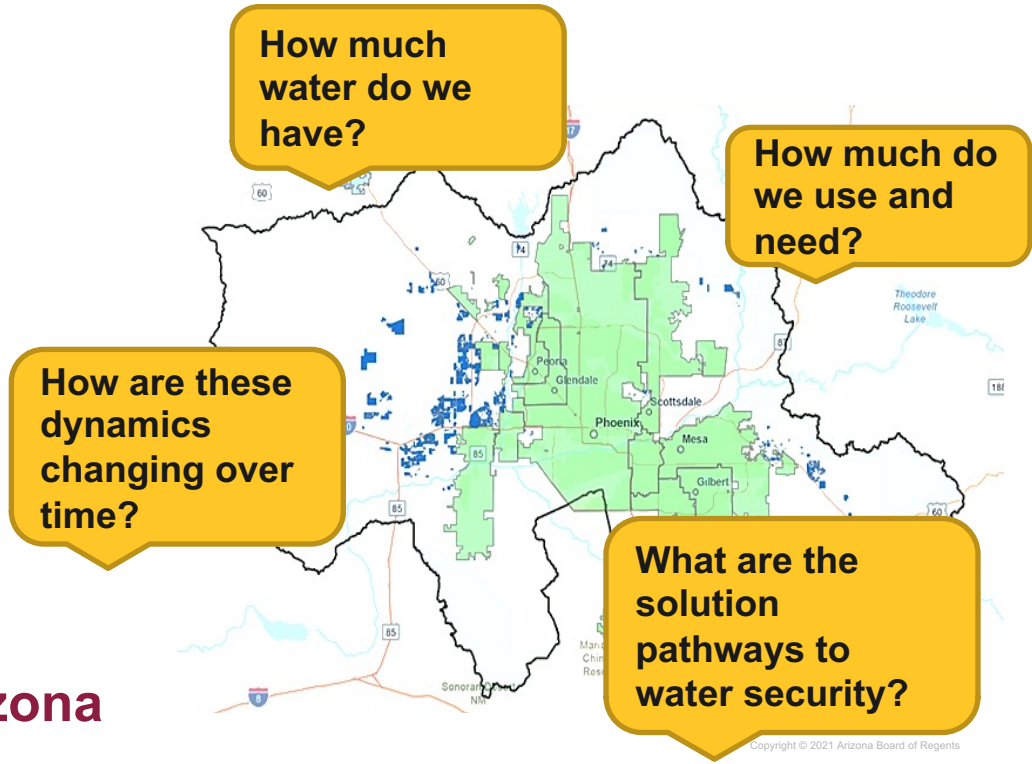
Supply-Demand Modeling for the State of Arizona

Current and future (scenario planning) balance between supply and demand

Water availability, population growth, municipal, industrial and agricultural demands, environmental requirements

Climate conditions and land use

Complements and informs



Innovation sprint - Central Arizona


ASU Charter
ASU is a comprehensive public research university, measured not by whom it excludes, but by whom it includes and how they succeed; advancing research and discovery of public value; and assuming fundamental responsibility for the economic, social, cultural and overall health of the communities it serves.
ASU

ASU knows how to create transformative change

Over the last 20 years, ASU has undergone a major redesign to become a higher education leader that advances simultaneous **access, excellence, impact at scale** at the state, national and global levels.

ASU is prepared to apply the same energy, innovation and dedication to improving **Arizona's water security**.

The ASU charter drives all we do

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Arizona's water future

water security

community impact

stimulate innovation

Julie Ann Wrigley Global Futures Laboratory™

Arizona State University

partner

Invitation

collaborate

Arizona Water Innovation Initiative

decision support

new technologies

re-envision policy

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