

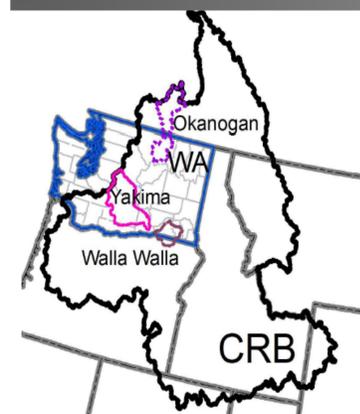
Motivation

- Water allocation is complex with dependence on hydrology, infrastructure, demands in space and time, and governed by institutions.
- Water reallocation is increasingly important for ensuring that water resources are applied to their highest-valued uses, whether in agriculture or other competing uses.
- Water markets can be powerful tools to allocate water to the highest-value uses and increase the productive value of water, but their efficacy is currently limited by several information-related constraints and transaction costs.

Objectives

- Enhance water use allocation efficiency and associated economic gains for irrigated agriculture and other water uses through improving emerging information systems and identifying complementary institutional innovations.
- **Develop and enhance a suite of technologies** to catalyze water use efficiency and water allocation among competing uses.
- **Identify opportunities/scenarios** for technology adoption and institutional adaptation; collect data through experiments, surveys, focus groups, and other sources.
- **Assess the efficacy and value** of new tools and rules for better water use efficiency.

Test Bed

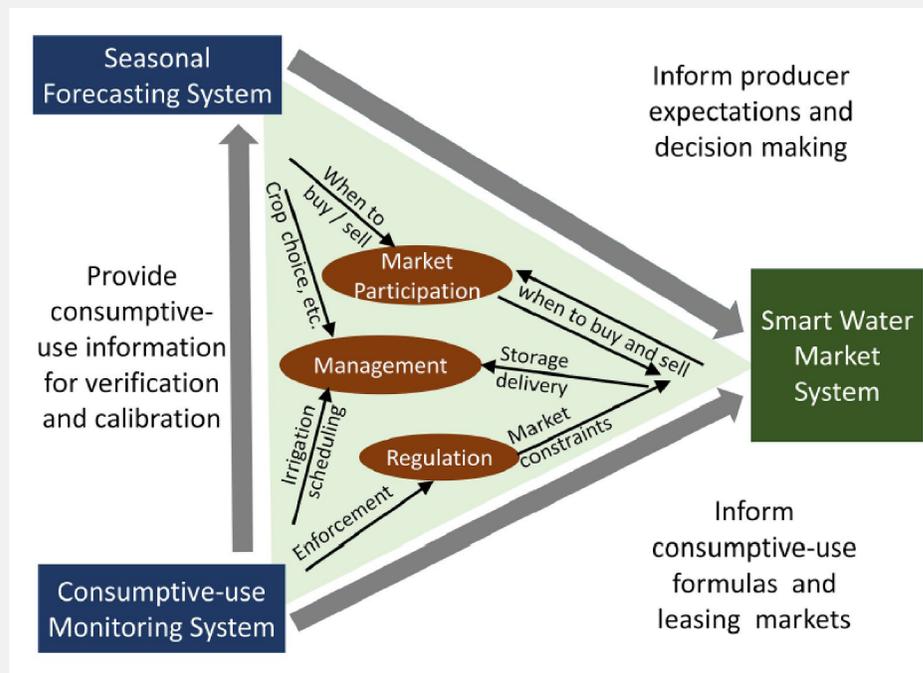


Columbia River Basin (CRB) in the Pacific Northwest U.S.

Focus on three watersheds within the Washington State part of the CRB.

Diverse along two key dimensions: (1) water shortage frequency and (2) transaction costs.

Focal technologies and Information Exchange



Institutional Change

Institutions are rules and norms that frame the relationships between individuals or organizations to the larger social environment.



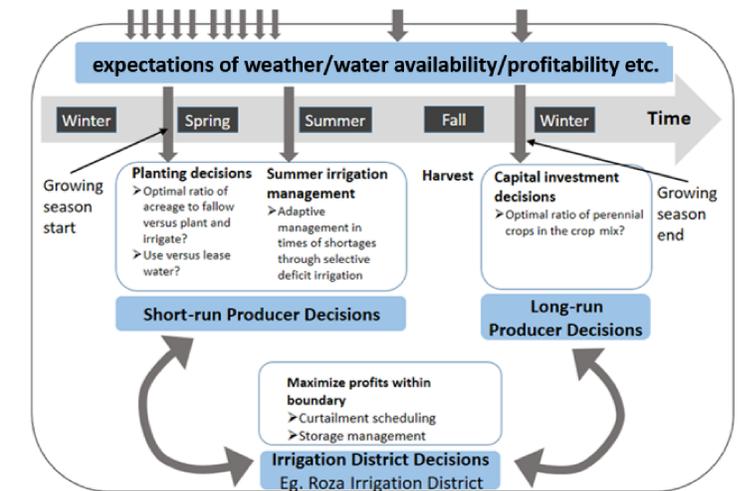
- Institutions evolve.
- Technology and institutions intersect and frame water use across competing uses.
- Identify ways that the focal technologies might support institutional change to improve water allocation efficiency.

Central Question: Quantifying Value

- Do the technologies and institutional changes enhance the functioning of water markets and allow efficient water reallocation? When and how?
- Are the values of the technologies enhanced in the presence of a well functioning markets?

Seasonal Forecast

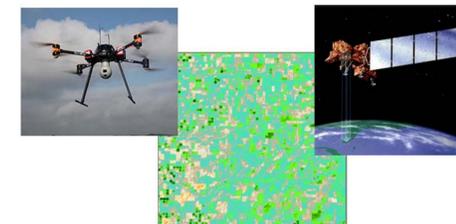
What is the value of seasonal-forecast defined expectations?



Hindcasting effort to identify

- when, where, what metrics can be forecast with enough lead time and forecast skill.
- when, where, and what metric forecasts can provide value to the decision process.

Consumptive Use Measurement



- Satellite and UAV based measurement and monitoring of evapotranspiration.
- Water rights are diversion based, but transactions are consumptive-use based.

- Mechanism to provide data that facilitates water market transactions as well as help ensure "security" of water rights.

Smart Market Modules

- "Gamified" smart market modules as a platform to help identify problems and solutions for water allocation
- Designed to incorporate outputs from the seasonal forecast and the consumptive use monitoring, and automate their use
- Simulation games are a data collection tools to estimate value of technology adoption and institutional adaptation.