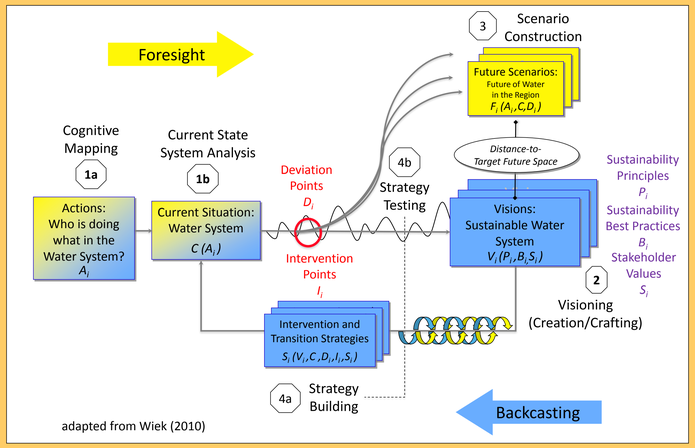
# The Water System in Central Arizona-Phoenix: Current State, Future Scenarios and Sustainability Vision

Lauren K Withycombe, Arnim Wiek, Kelli Larson, Danielle Shaffer

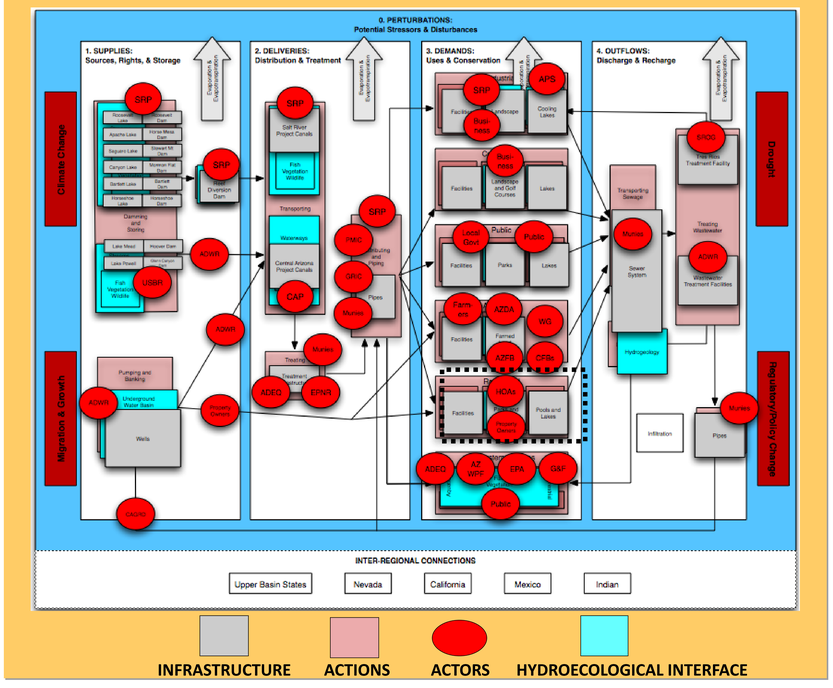
ASU School of Sustainability
Arizona State University
A Unit of the Global Institute of Sustainability

## A Transformative Research and Problem Solving Approach[1]




1) Analyze Current State
   a) Cognitive mapping: key components of the water system
   b) Roles and responsibilities: who is doing what with water?
   c) System analysis: key interactions between components
2) Construct alternative future scenarios
   a) Use Sustainability Assessment Methodology to assess future scenarios
3) Select among future scenarios the most sustainable
   a) Craft desirable scenario into future vision
4) Develop strategies to achieve vision and avoid undesirable alternatives

## Cognitive Map ($A_i$) of Water System in Central AZ-Phx[2]




## Perceptions and Cross-Perceptions of Roles and Responsibilities: Interviews with Actors in the Water System

Part 1: In your role in the water system what responsibilities do you have, what barriers do you encounter when carrying out these responsibilities and how much of an impediment are these barriers?

| Your responsibilities | Barriers | Strength of Barriers |
|---|---|---|
| | | 1 2 3 4 5 ❑ ❑ ❑ ❑ ❑ |

Part 2: Who are other important actors in the water system, what are their responsibilities, what barriers do they encounter, how much of an impediment are those barriers?

| Other key actors | Their responsibilities | Barriers | Strength of Barriers |
|---|---|---|---|
| | | | 1 2 3 4 5 ❑ ❑ ❑ ❑ ❑ |

Part 3[2,3]: What sustainable governance roles and responsibilities are encompassed by your current role, which belong to other actors, what barriers do you or others face in trying to carry out these responsibilities, how much of an impediment are those barriers?

| Sustainable Governance Role | You | Other | Barriers | Strength of Barriers |
|---|---|---|---|---|
| Anticipate future stressors and shocks to water supplies | | | | 1 2 3 4 5 ❑ ❑ ❑ ❑ ❑ |
| Develop and implement plans to manage supply in varying future conditions | | | | |
| Promote and incentivize water conservation | | | | |

Part 4: Who do you interact with in the water system and how intense are these interactions?

| Organizations and Agencies | 1-way info sharing | 2-way communic. | Collabor-ation | Joint Decision Making |
|---|---|---|---|---|
| USBR | | | | |
| ADWR | | | | |
| SRP | | | | |
| CAP | | | | |

### Sample: Who is being interviewed?

*Sources and Allocations:* Lawyers and policy makers with expertise in and power over water rights claims and adjudication; agencies and organizations that manage water supply

*Deliveries:* Water providers including municipal and private utilities, municipal and tribal governments and intergovernmental organizations

*Demands:* Users from all sectors, state agency staff with interest in or jurisdiction over demand sectors, water user associations, researchers, advocates and educators

*Outflows:* Staff, managers, engineers from public agencies and private organizations who treat or oversee the treatment of wastewater, the development of wastewater and flood control infrastructure and plans

*Crosscutting:* Researchers, media representatives, educators, boundary organization staff, advocacy groups

## System Analysis: Developing *Coherent* Scenarios and Vision

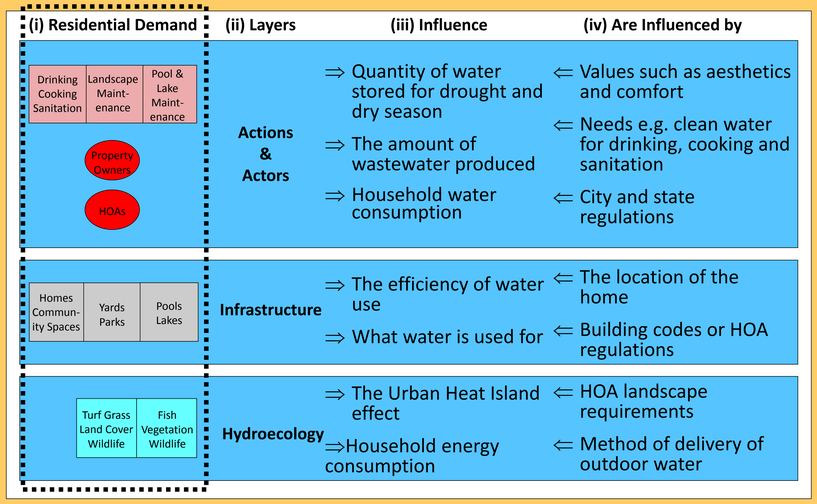
Systems analysis is a tool to understand causal linkages in complex systems.

Data is collected on the current state of system components, which are identified during cognitive mapping

System components are used as variables in systems analysis and in scenario construction.

The process of identifying and analyzing causal relationships, feedbacks and lags in the system ensure that the scenarios and vision are *consistent*.

### Residential Water Demand as Example of System Complexity




**(i) "Demands":** Boxes and circles are the key components of residential water demand

**(ii) "Layers":** Domains to organize key components

**(iii) "Influence":** Systemic linkages that are influenced by the particular layer within residential water demand

**(iv) "Are Influenced by":** Systemic linkages that influence the particular layer within the residential water system

## Future Research

Developing plausible future scenarios of the water system and using Decision Theater to construct and present scenarios

Assessing future scenarios using Sustainability Assessment Methodology

## Sources

[1]Wiek A (2010) Sustainability research and problem-solving frameworks. Working Paper. School of Sustainability, Arizona State University.
[2]Wiek A, Larson K (2011) *Water governance, people, and sustainability – A systems approach*. Unpublished manuscript.
[3]Gibson R (2006) Sustainability assessment: Basic components of a practical approach. *Impact Assessment and Project Appraisal* 24 (3), 170-182.

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