

## Adapting Urban Water Systems to Manage Scarcity in the 21<sup>st</sup> Century: The Case of Los Angeles

The California Center for Sustainable Communities at UCLA has been working to holistically understand water scarcity risks that are associated with existing water management systems and water availability assumptions in Los Angeles County (LA) that can also be applied to other semi-arid cities.

This research examines the social and technical adaptations necessary for LA to adjust to future water management challenges and maintain long-term sustainability and water reliability while encountering climate change and urban population growth.

### CCSC PROJECT GOALS:

**Identify** physical water resources that the socio-technical system has marginalized.

**Propose** framework to achieve greater water self-reliance for semi-arid cities.

**Understand** how infrastructure, management regimes and behavior interact to influence resource trajectories.



### GEOGRAPHIC FOCUS:

This work is focused within the Los Angeles County (LA) metropolitan region as exemplary of other similarly situated cities.

### METHODOLOGY:

- This project utilized multiple modeling approaches based on empirical data.
- Methods and findings via previous interdisciplinary research were compiled to systematically deconstruct the complex layered water system in the county Metropolitan area.

## CCSC PRELIMINARY FINDINGS:

- Water conservation is critical to reducing demand to levels that can be supplied locally.
- Social construction surrounding water management impedes full utilization of physical resource capacity.
- Infrastructure and expectations create circumstances that create water shortages.
- Both changes in system governance and investments in existing infrastructure will be necessary to achieve self-reliance in a region such as LA (Table 1).
- Los Angeles County can become largely water self reliant.
- Requires better utilizing potential in groundwater resources.
- Changing outdoor landscaping to reflect the climate is critical.
- Utilizing water carefully is essential.

**Table 1** Nine themes toward water self reliance for semi-arid cities

Theme 1.

Use Scientific Knowledge for Outdoor Water Conservation

Measure water use for outside vegetation, including, for each, trees, shrubs and lawns.

Theme 2.

Maximize Use of Groundwater Basins

This includes detailed hydrologic analysis, recharge capacity and users.

Theme 3.

Upgrade Wastewater Systems for Water Quality and Reuse

Wastewater is a misnomer going forward in the 21<sup>st</sup> century. This is important water supply.

Theme 4.

Emphasize New Water Cycles

Developed closed loop systems where water is reused and kept in the urban system, including groundwater.

Theme 5.

Import Water only in Wet Years

Many semi-arid regions do have high rainfall years. Maximize storage to take advantage of those years.

Theme 6.

Capture Stormwater in Large and Small Infrastructure

Stormwater is an important water supply that needs space to infiltrate. Maximize that capacity throughout the urban system.

Theme 7.

Recognize Tradeoffs in Water Uses

Instream flows versus infiltration is an issue that can have esthetic and recreational implications.

Theme 8.

Integrate Old and New Infrastructure

Take advantage of existing infrastructure, adapt and reoperate as well as create new infrastructure.

Theme 9.

Recapitalize and Consolidate Retailers

In places where there is a proliferation of small providers and fragmented systems, cost effectiveness and coordination is enhanced by consolidation.

## NEXT STEPS:

- Natural water shortages must be attributed to both climate change and how water - systems are constructed and managed over time.
- Going forward, we must understand the ways in which socio-technical systems evolve to construct resource availability and/or scarcity and vulnerability in cities.

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