

Issues

Los Angeles County faces a future of reduced imported water. Many agencies are currently considering investments in local water sources, but studies are typically uncoordinated across urban water sectors or only consider a few cities. Compiling 10 years of research, we asked:

- 1) What is the potential for local water supply in Los Angeles County?
- 2) What barriers exist to maximizing local supplies to provide a majority of water in LA?

Approach

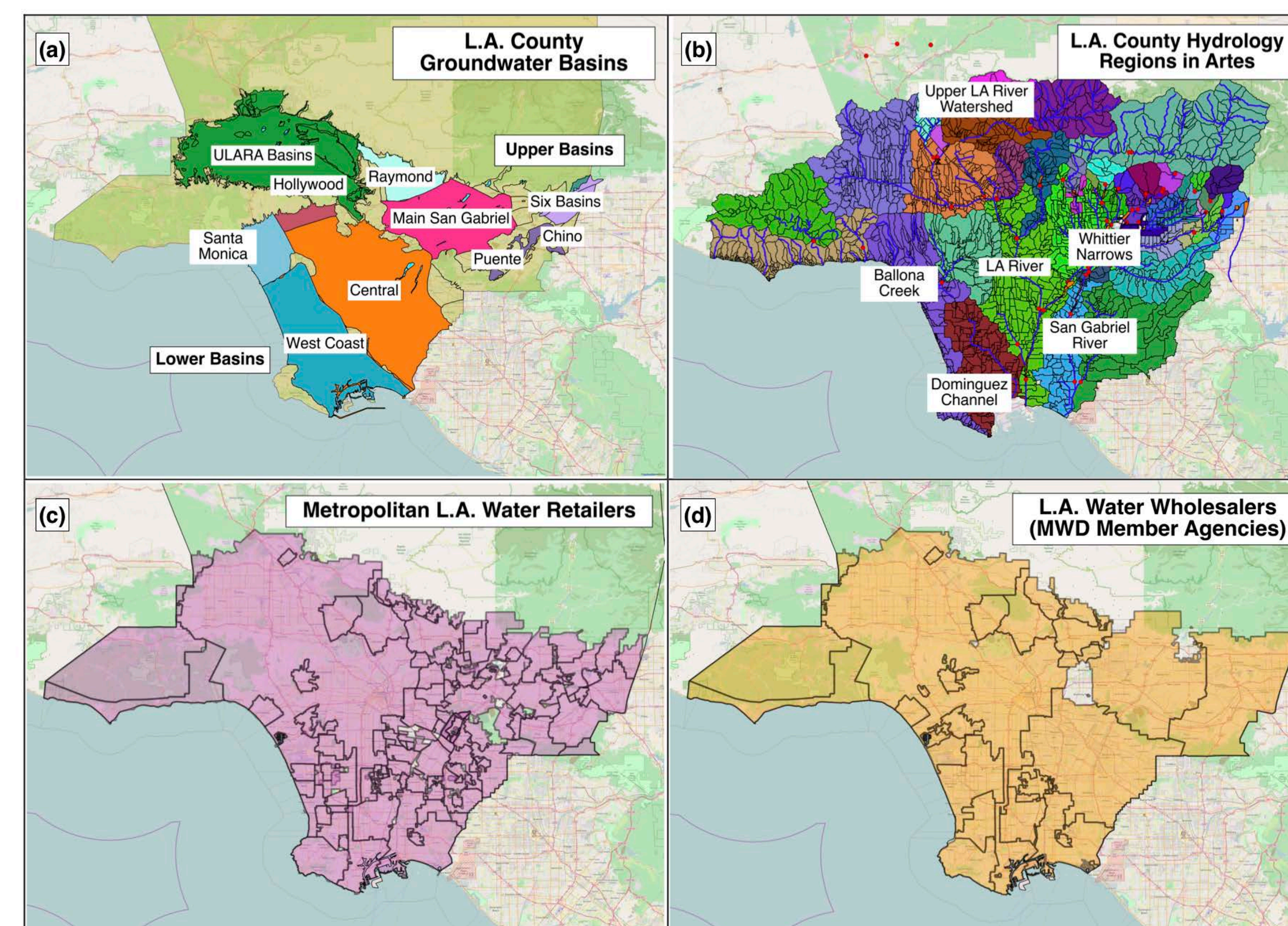
We collected data on all the sectors and natural systems of urban water management in LA County:

- **Water Agencies:** More than 100 large agencies import, sell, and re-sell water to over 9 million people and businesses.
- **Groundwater Basins:** Over 300 pumpers, including water agencies, companies, and private individuals, have rights to pump from 7 adjudicated areas.
- **Hydrology:** We compiled flows from an LA County hydrology model with over 2,600 watersheds (WMMS)
- **Stormwater Capture and Water Reuse:** LA has invested in alternative water sources for decades. We inventoried current and proposed projects.
- **Economics:** We collected data on costs and benefits of water from hundreds of sources and standardized them based on long-term annualized values.
- **Urban Ecology:** Trees and lawns use water, with over 50% of water use in LA going to residential landscapes. We took experimental data to assess actual tree and lawn water use.
- **Historic Flows:** We collected 25 years of monthly records for imported water, wastewater and water reuse, and hydrology.

We assembled this data in a network flow model, **Artes**, to assess the potential for local supply given water use, achievable conservation, landscape needs, and economics.

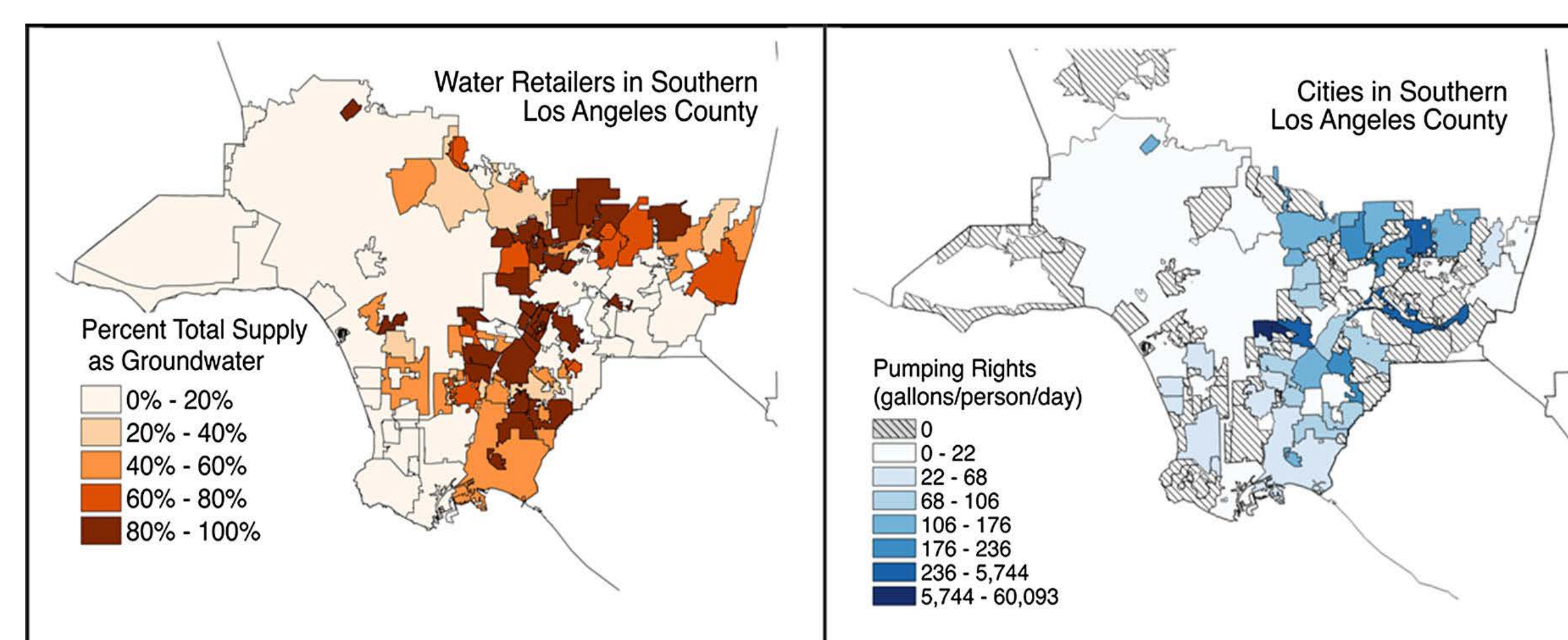
Results

Mapping reveals the people, plants, pipes, rivers, and groundwater basins that comprise LA water systems.



Groundwater rights, water supply sources, and agency capacities vary significantly in LA.

- **Imported Water Reliance:** Many water retailers (35%), such as the City of L.A. or the Walnut Valley Water District, receive a majority of supplies from imports
- **Groundwater is Key, Now and in Future:** Others, such as the cities of Alhambra or Azusa, rely primarily on groundwater, which may be recharged naturally or with imported water
- **Stormwater Benefits Linked to Groundwater Rights:** Many cities responsible for stormwater management do not have groundwater pumping rights, so they cannot benefit from augmenting water supply



Findings and Insights

- **LA Can Rely Primarily on Local Water.** Results from interdisciplinary modeling show that LA agencies can reduce imported water reliance by 50% or more, while protecting urban trees and economic productivity.
- **Local Water is Economically Competitive.** Using long-term costs, local water is economic and often cheapest. Agency fragmentation inhibits financing.

Cost of Supply/Shortage	20-yr Annualized Cost (per ac-ft)	Direct Benefits (per ac-ft)
MWD Imported Water (Tier 1 treated)	\$1,476	-
MWD Imports After Tunnel Upgrades (estimated)	\$1,790	-
Groundwater Pumping	\$582	-
Existing Large Stormwater Capture	\$256	\$40
Proposed Large Stormwater Capture	\$371-\$1,988	\$40
Existing Recycled Water	\$556-\$1,646	-
Proposed Recycled Water	\$1,023-\$2,043	-
Residential Shortages	\$1,300-\$9,437	-

- **Institutions and Groundwater Rights are Key:** Restructuring pumping rights through reallocations and exchanges lessens impacts of reduced imported water.

More Information and References

The LA Water Hub: <http://waterhub.ucla.edu>

Artes: Open-Source modeling and data of LA water
<https://erikporse.github.io/artes/>

Sustainable LA Grand Challenge

<https://grandchallenges.ucla.edu/sustainable-la/>

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- Litvak E, et al (2017) Evapotranspiration of urban landscapes in Los Angeles, California at the municipal scale. *Water Resources Research*.
- Pataki DE, et al (2011) Transpiration of urban forests in the Los Angeles metropolitan area. *Ecological Applications* 21:661–677.
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