

Evolution of Groundwater Management in Los Angeles

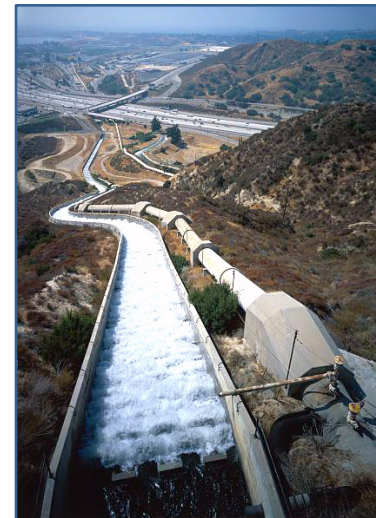
Sustainable L.A. Grand Challenges

UCLA

15 June 2016

Background

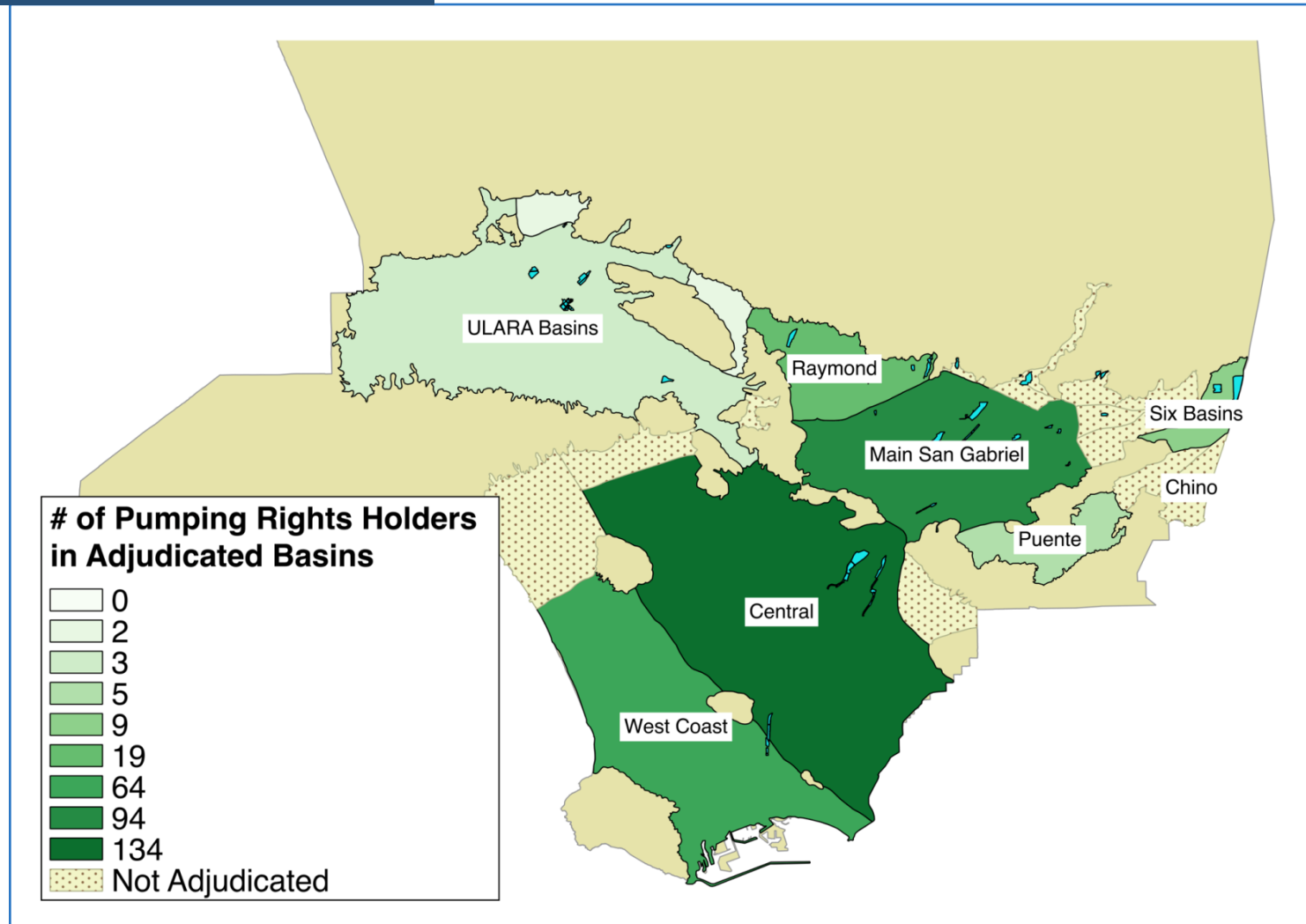
- Over decades, pumping rights and management has evolved in the adjudicated groundwater management areas of L.A. County
- Imported water facilitated groundwater adjudications and development of Southern California's water management agencies
- Growing scarcity, climate change, and population growth will strain available water imports for groundwater recharge



LA Aqueduct
Credit: Lowe (2001)

Current Rights

Current Groundwater Rights Holders



(data collected for 2011-13)

Evolution

- **Control of groundwater rights** is evolving, becoming more *public* and *consolidated*
 - Smaller rights' holders selling or leasing to larger public agencies and water utilities

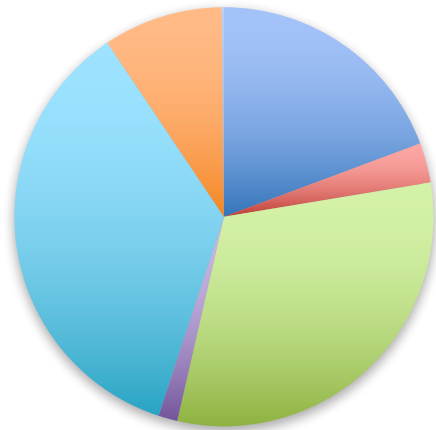
		West Coast	ULARA*	Six Basins	Raymond	Main San Gabriel	Central
Judgment	Private	13,486	0	0			
	Public	0	55,970	6,657	29,140	9,252	35,335
	Publicly-Regulated	15,743	0	6,705	2,299	33,400	46,598
	Non-Profit	0	0	2,972		11,025	
	Total	29,229	55,970	16,334	31,439	53,677	81,933
Current	Private	9,549	0				
	Public	19,495	279,671	12,740	36,397	22,565	86,495
	Publicly-Regulated	35,039	0	6,888		24,613	13,029
	Non-Profit	0	0	5,467		17,747	
	Total	64,083	279,671	25,095	36,397	64,926	99,524

Table 1: Distribution of pumping rights among the top five rights' holders in six basins of the study area. The trend shows a consolidation in pumping rights among large users

- **Allocation of rights** varies by basin across different types of users (Figure 1)

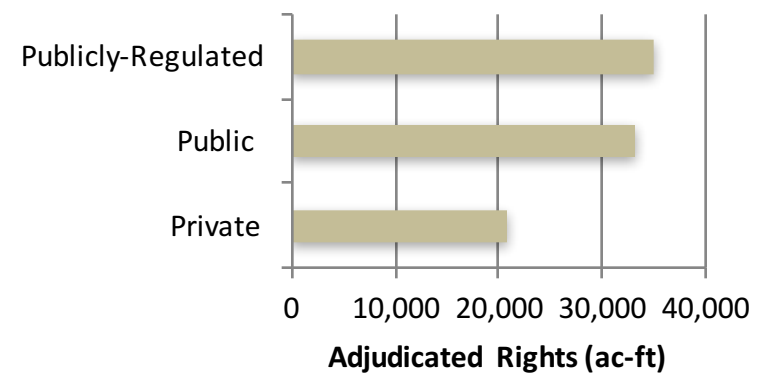
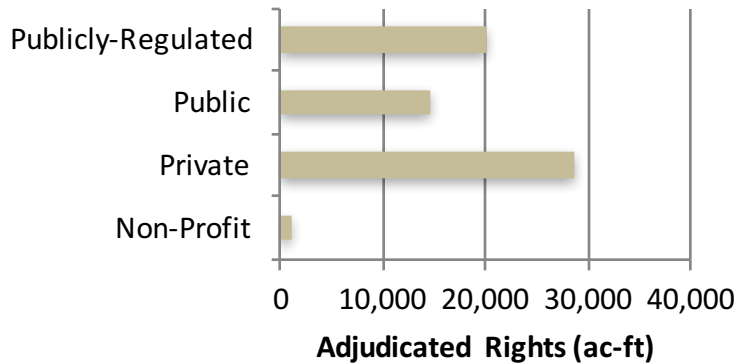
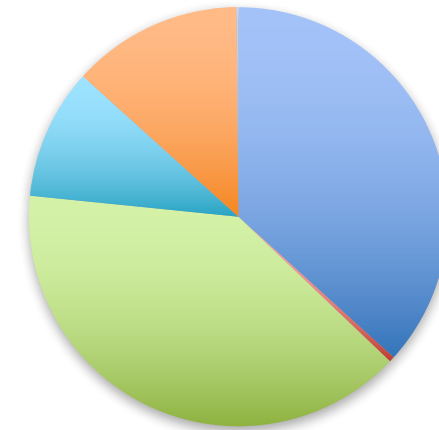
West Coast Basin

1965 Adjudicated Rights



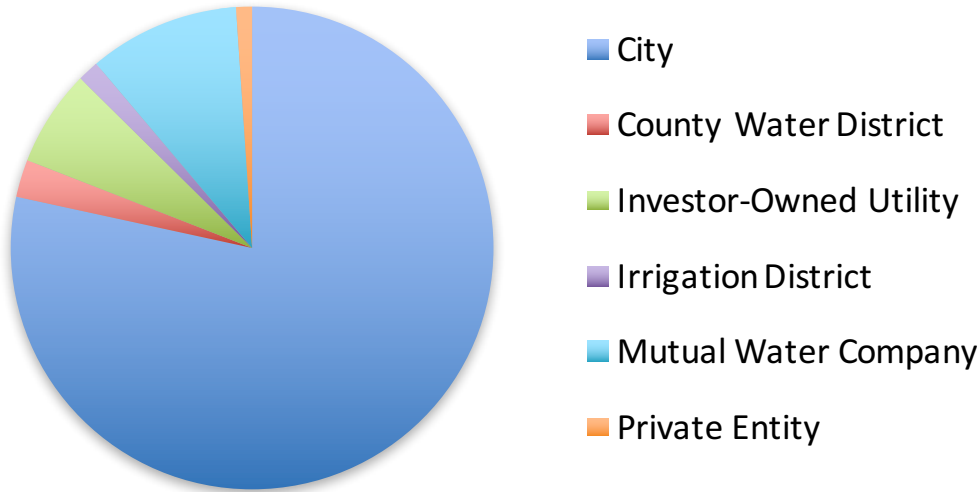
- City
- County
- Investor-Owned Utility
- Mutual Water Company
- Oil and Chemical Company
- Private Entity
- Sanitation District
- Unified School District
- Water Investment Company
- Water Replenishment District

2013 Extraction Rights

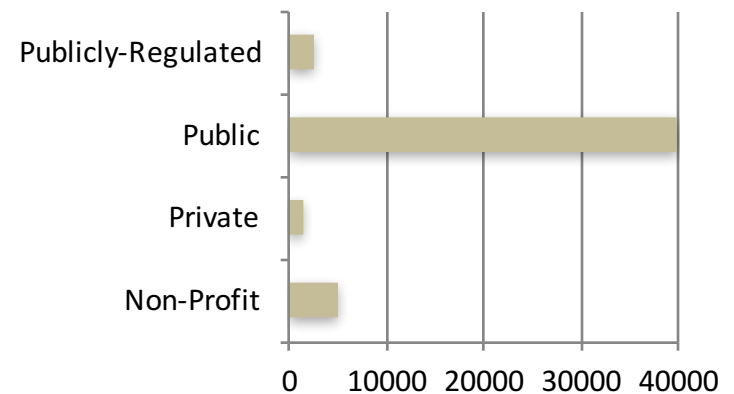
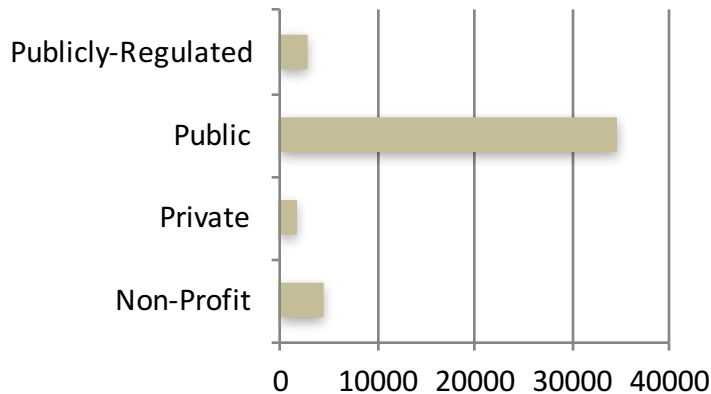
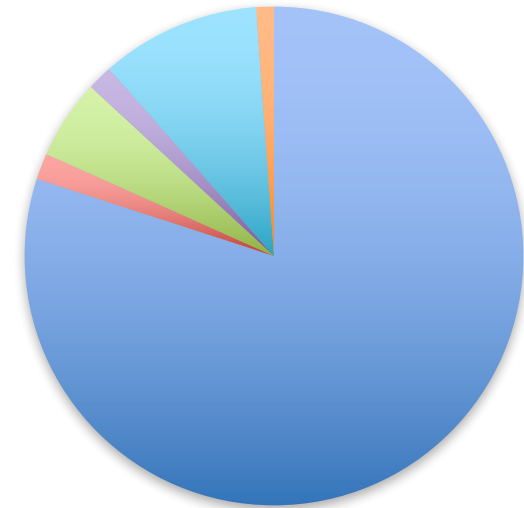


Raymond Basin

1955 Adjudicated Rights



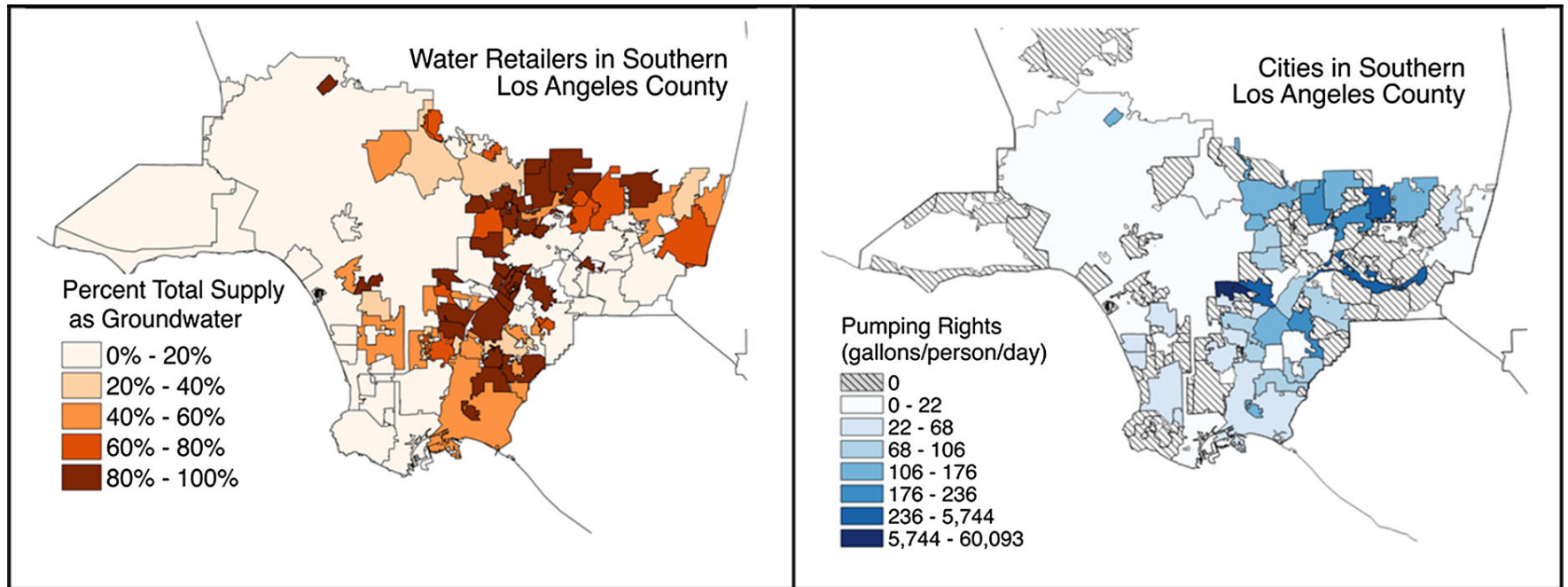
2013 Extraction Rights



Findings

- **Per capita groundwater rights** vary widely throughout the region
 - For instance, the City of Santa Fe Springs has ~220 gallons/person/day (gpd), while the City of Artesia has less than 2 gpd
 - Across the county, Upper Basin users tend to have more per capita pumping rights
- The majority of cities with rights (28) have rights of less than 100 gpd
 - Twelve cities have rights less than 22 gpd.
 - Many cities in the region would not meet even conservative estimates of per capita daily water use with current groundwater rights
- **Nearly one-third of cities have no groundwater rights** and no direct access to groundwater for water supply.
 - Water managers throughout L.A. increasingly look to use distributed stormwater infrastructure to improve water quality and recharge groundwater basins
 - Cities must pay for stormwater infrastructure upgrades, but if they have no pumping rights, they cannot use projected water supply revenues to pay for new stormwater systems.

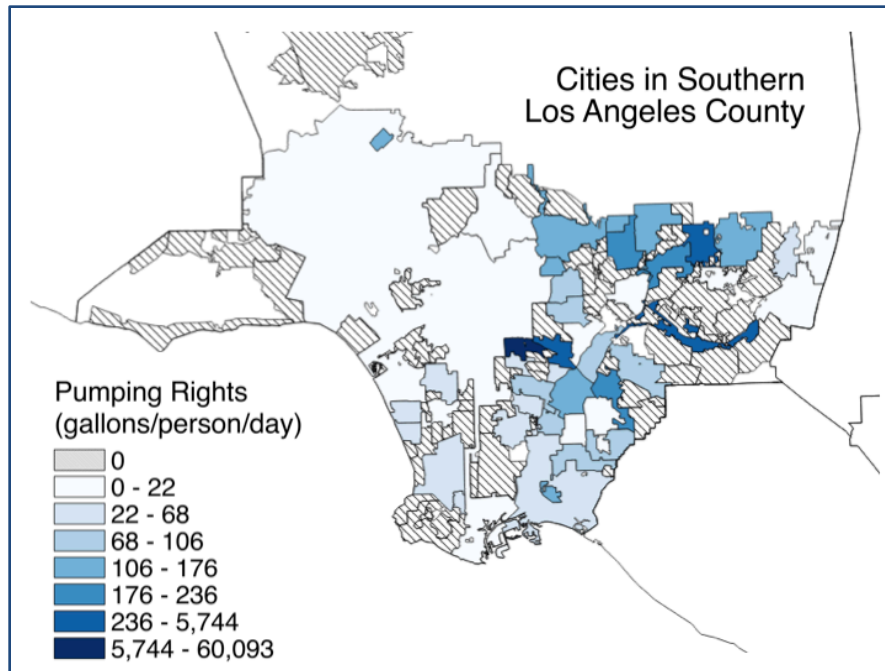
Water Supply Sources



Percent supply from groundwater (left) and per capita pumping rights (right) for water retailers in LA County

Beyond Groundwater

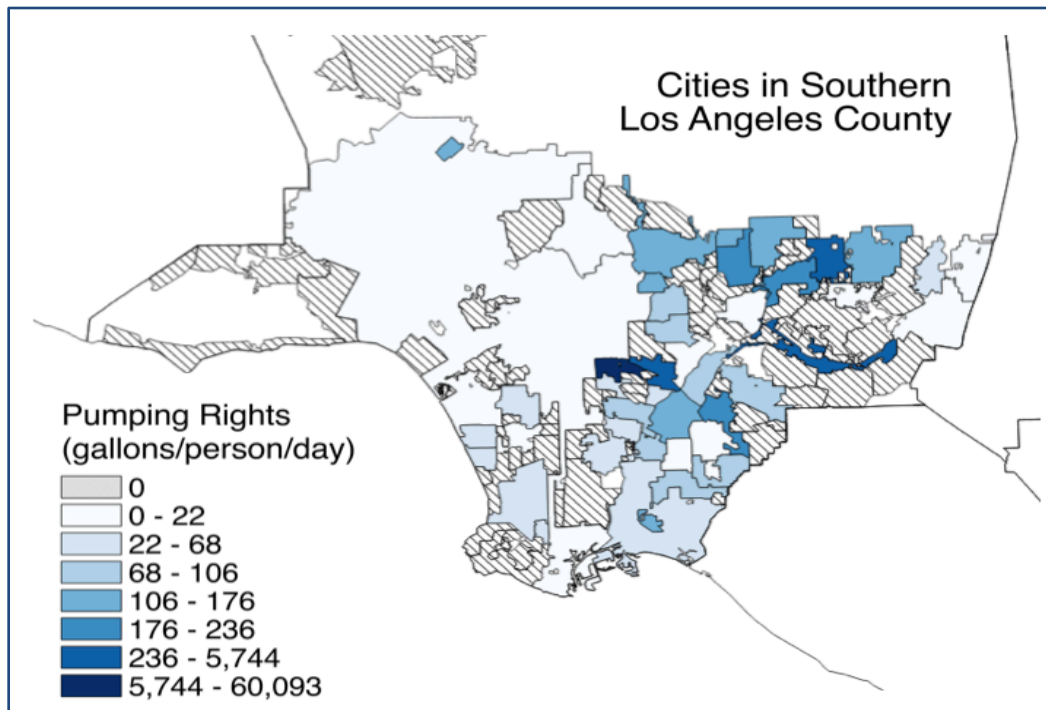
- **Cities and groundwater rights:**
 - With pumping rights in adjudicated basins, cities have more options for over-year storage
 - Stormwater and recharge: Municipal permits



LA City Stormwater Capture Master Plan

Beyond Groundwater

- Cities and groundwater rights:
 - With pumping rights in adjudicated basins, cities have more options for over-year
 - Stormwater and recharge: Municipal permits
 - storage



LA City Stormwater Capture Master Plan

Findings

- Management system is highly fragmented across the region and still divided by urban water sectors (groundwater, stormwater, water supply)
- Despite challenges, the complex and polycentric system of groundwater management has managed to adapt over time
 - Actors of varying sizes and organizational structures negotiate transactions and water transfers, moving water from areas of greater abundance to areas of scarcity
 - But these are short term adaptations, not long term changes for climate change
 - Limited in scope as well: landscaping needs to evolve, infiltration, stormwater capture and water recycling need substantial inter and transjurisdictional institutional reform
- Adaptive capacity is constrained by established allocations of rights, limited cost-effective storage, diverse institutional knowledge, and decreasingly available imported water

Policy Recommendations

Policy Recommendations

Reduce reliance on imported water	Watermasters must plan for long-term reductions in available imported water for recharge. Management must focus on reducing water demands and replenishment of basins from captured local stormwater.
Identify capacity for water reuse	Water reuse can reduce imports, but it requires assessments available groundwater basin capacity, where water can be stored, as well as new infrastructure for piping. New regulations enabling collective storage pools in groundwater basins can allow agencies to develop collective reuse projects.
Reallocate groundwater rights	Codified groundwater rights inhibit system flexibility and adaptability to meet future scarcity challenges. More equitable access to groundwater will help greater water self reliance but will require reallocating some extraction rights as agencies store more water in groundwater basins to meet water shortages during droughts.
Regulate groundwater for this century	L.A. County's diverse groundwater management system mirrors statewide fragmentation and local control. State and regional agencies must manage across diverse climates and cultures. New sustainable groundwater management regulations should build on the knowledge of L.A. approaches but, unlike L.A., reduce institutionalized reliance on imported water.

References

All information from this presentation was gathered from a publication included in CCSC's 2015 research report to the Haynes Foundation, *Water Management in Los Angeles*, available [here](#).

Porse E., Glickfeld M., Mertan, K., Pincetl, S. "*Pumping for the masses: evolution of groundwater management in metropolitan Los Angeles*". *GeoJournal*. (2015). doi: 0.1007/s10708-015-9664-0