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I used WaterSim 6 to explore four water conservation strategies: rainwater harvesting, gray water use, growth management, and efficiency of water use. I also examined stormwater produced.

21st Annual CAP LTER All Scientist Meeting and Poster Symposium
11 January, 2019;
SkySong, Scottsdale, AZ

Outdoor Water Demand and Rainwater/ Stormwater Production: WaterSim 6

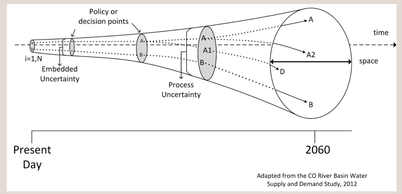
In Brief:

- The Colorado River and the Salt-Verde Rivers of AZ, together, supply most of the municipal water used in the Phoenix Metro Area

- We are in the twentieth year of drought (surface supplies are reduced)
- The Sustainable Futures Scenarios project co-developed potential, future, scenarios for 2060
- The Strategic scenario has:
  - Rainwater harvesting
  - Gray water use
  - Urban infill/ increased density of development
  - Use of reclaimed water
  - Reduced agriculture

WaterSim 6

WaterSim uses advanced scenario analyses to explore the impact of policies and strategies on water sustainability goals in the face of multiple stressors: population growth, climate change, and drought (Sampson et al. 2016).



Land-cover land-use change for the Phoenix Metropolitan Area permits alternative growth scenarios; we can assess the impact of changes in water use sectors (i.e., agriculture) and housing density on water demand.

Alternative water supplies (e.g., rainwater harvested , gray water, and stormwater) supplement potable water for meeting outdoor water demands (Sampson et al. in preparation).

Key Results:

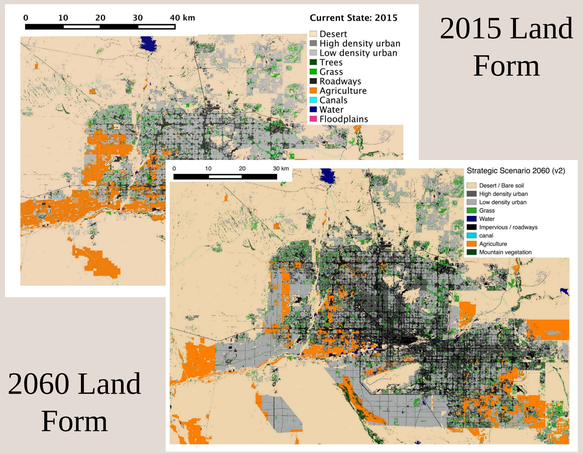
Regionally

- Captured rainwater could meet 7% of all outdoor water demands, but as much as 28%
- Diminished surface water supplies were offset by rainwater, gray water, and reclaimed water, but also increased municipal pumping
- Increased water use efficiency and growth management, together, could reduce outdoor water demand by 100% or more

Locally

- Significant difference in rainwater harvested among individual water providers. Mean outdoor water demand met varied ten fold (3-40% met)
- Stormwater produced 0.2 to 2 gallons ft^2; rainfall could generate 0 to 325k acre-feet yr^{-1}

Land-Cover Land-Use as Inputs



2015 Land Form

2060 Land Form

Three million new residents

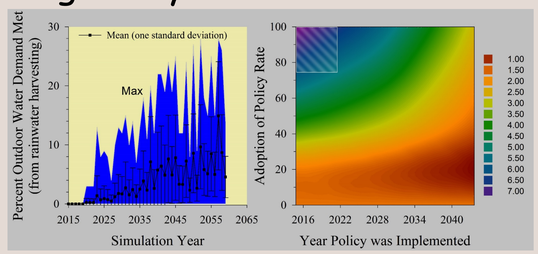
Simulations Manipulated:

a) Rainfall
b) Runoff (RCP 8.5)
c) Policy adoption rate &
d) Timing of implementation
e) Population growth rate
f) Water use efficiency

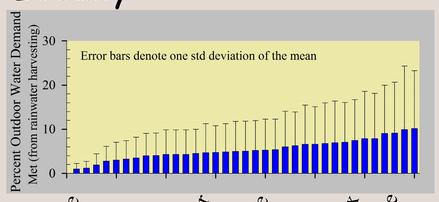
10,000 Scenarios
21,700,315 observations

Rainwater Harvested

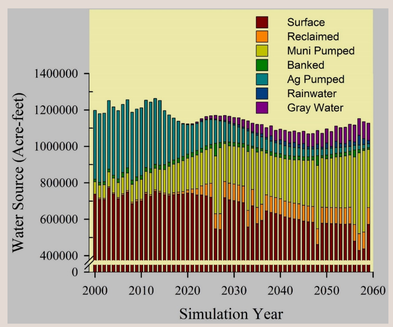
Regionally



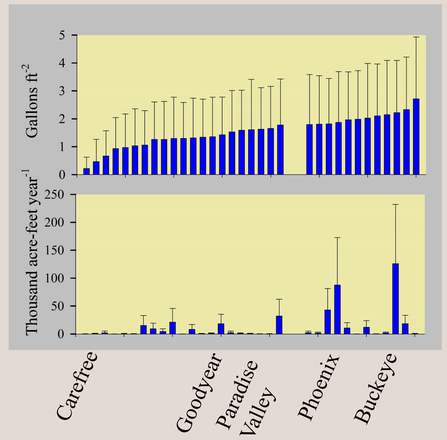
Locally



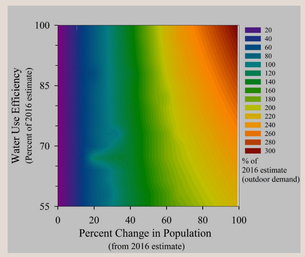
Water Source



Stormwater Runoff



Outdoor Water Demand



References

- Sampson, D.A., R. Quay, D. White. 2016. Anticipatory modeling for water supply sustainability in Phoenix, Arizona. Env. Science and Policy 55: 36-46.
- Sampson, D.A., E.M. Cook, M.J. Davidson, N.B Grimm, D.M. Iwaniec, X. Li. Simulating Alternative Sustainable Water Futures for the Phoenix Metropolitan Area using WaterSim 6. In preparation.

Acknowledgment

I thank Xiaoxiao Li for creating the land-use land-cover maps for the scenarios. E. Cook, D. Iwaniec, N.B. Grimm, and M. Davidson for help with parameterization of the model. And participants of the Sustainable Future Scenarios workshop series. This material is based upon work supported by the National Science Foundation under Grant No. SES-0951366 Decision Center for a Desert City II: Urban Climate Adaptation (DCDC). Any opinions, findings and conclusions or recommendation expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF).