



FEWSTERN

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**Simulating and optimizing FEWs across
continental US at the county-scale**

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Tess Russo, Tara Troy, Maura Allaire, Michelle Ho, Upmanu
Lall

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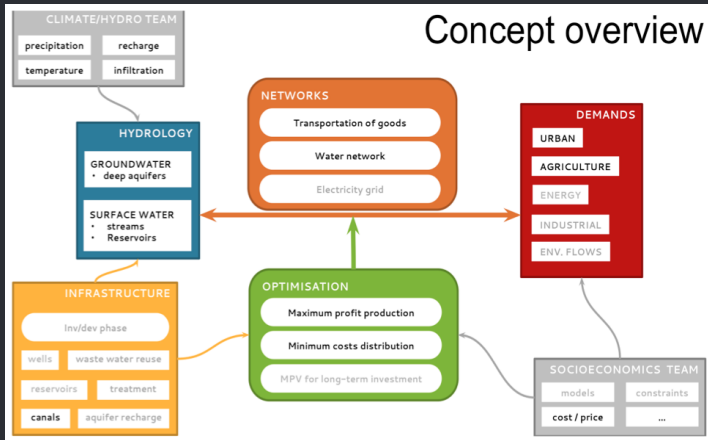
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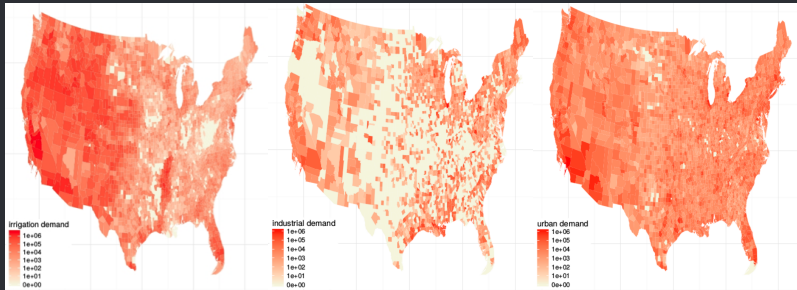
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- Monthly timestep to capture seasonal variation
- Time horizon of ~ 10 years to study decadal climate oscillation

AWASH: America's Water Analysis, Synthesis and Heuristic



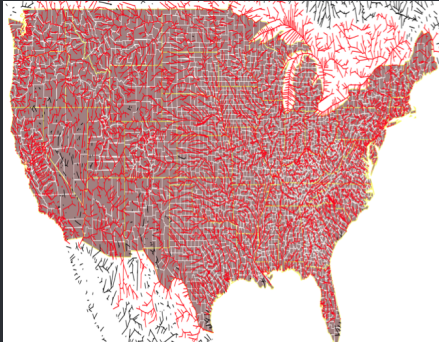
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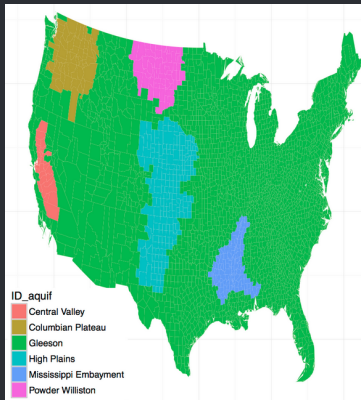
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Research questions

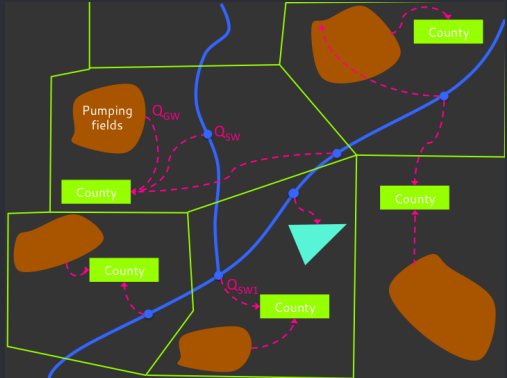
Simulation How climate variability affects ability to satisfy FEWs demands?

Optimization How should FEWs resources be managed to increase resiliency?

Model formulation

Goal: determine optimal operations, e.g.

- SW withdrawals
- GW pumping volumes
- Reservoirs captures and releases



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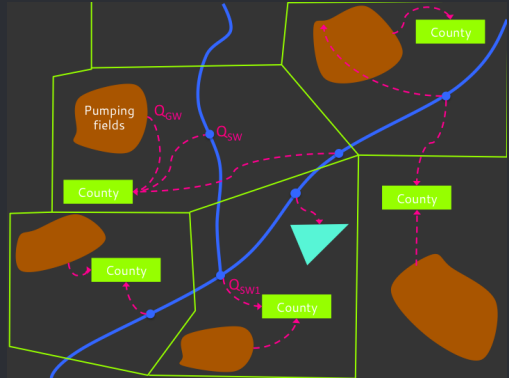
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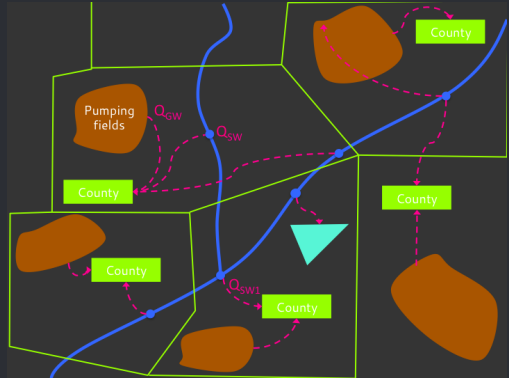
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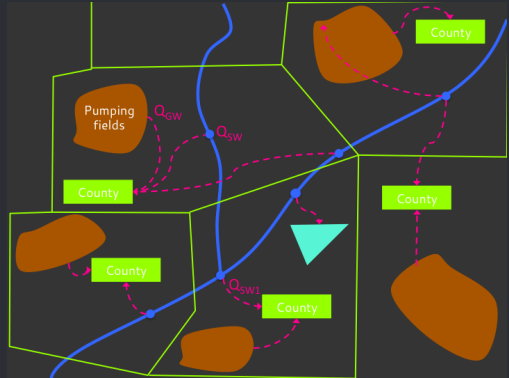
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→ Linear formulation: allows for large scale applications and the systematic propagation of uncertainty

Results

An example to illustrate the potential of the approach:

- Considering current demands and crop choices, how does irrigation demand fluctuate in function of the climate?
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Agriculture

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- Statistical yield model to estimate crop production in function of irrigation and rain (endogenous irrigation water demand model)

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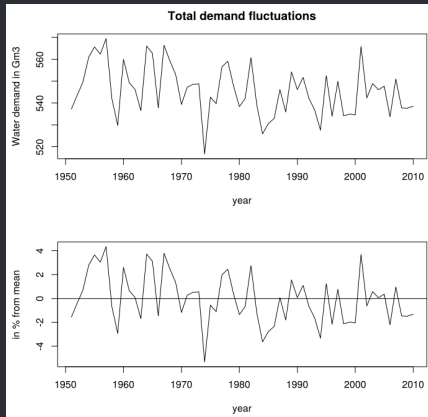
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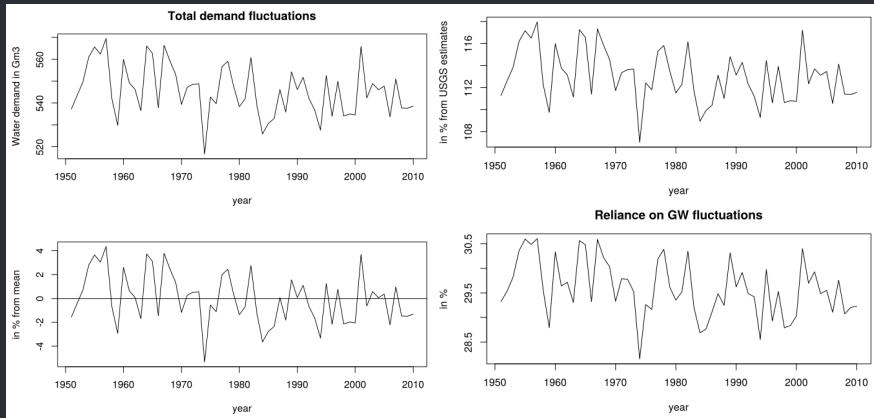
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Comparison with USGS estimates



Results - Colorado

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- Meeting water demands
- Function of water availability
- Infrastructure capacity
- Crop constraints (e.g. cultivated area)

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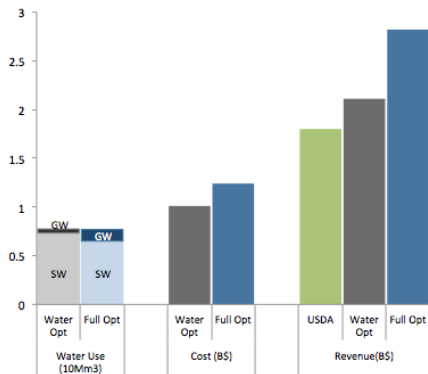
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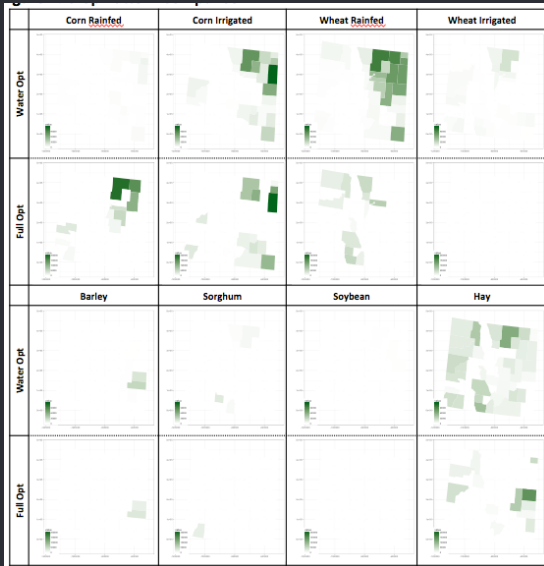
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- Endogenous demand models for the urban and industrial sector
- Climate inputs: 500 years of reconstructed streamflows
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AWASH a tool to model FEWs

- Changes in food preferences
- Penetration of renewables
- Infrastructure design and Environmental policy

Acknowledgments

Funding agencies

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References

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