IM3 INTEGRATED MULTISECTOR MULTISCALE MODELING

URBAN POPULATION, MORPHOLOGY, AND WATER DEMAND

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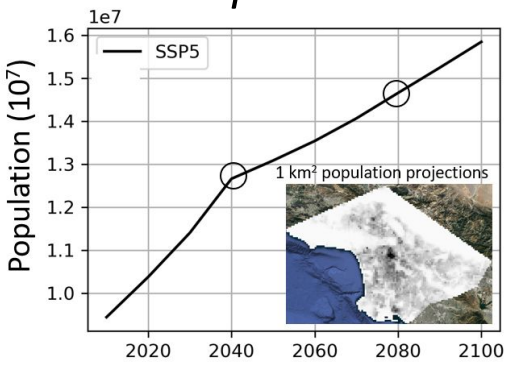
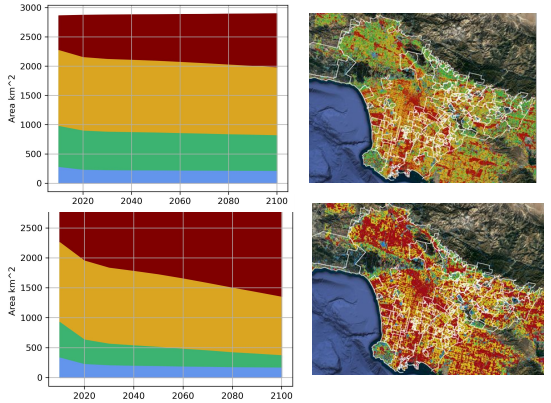
POPULATION, MORPHOLOGY, AND WATER DEMAND: LA CASE STUDY

Gridded Population and Urban Intensity Projections

Population

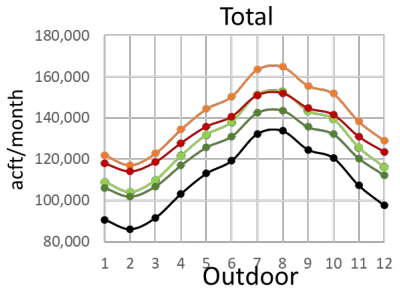


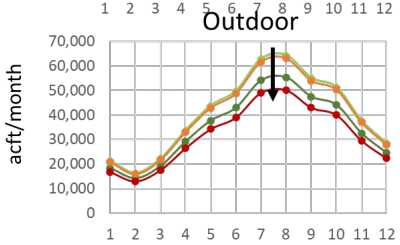
Urban Growth Model



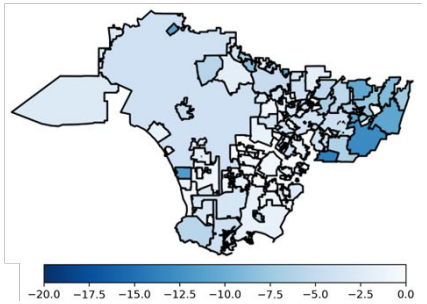
*Unit water demands from **observational data***

Future Water Demand Projections



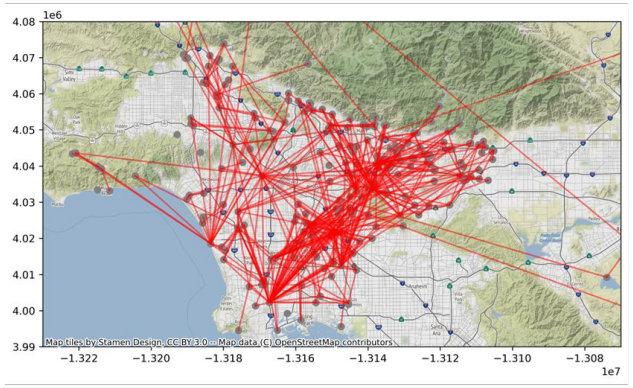


% reduction outdoor demand

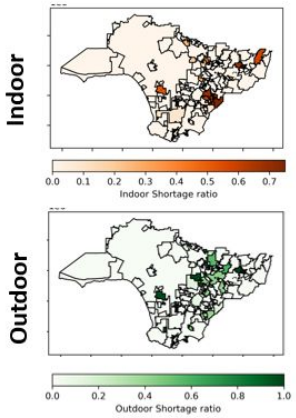


Demand Scenarios

Water Supply Model



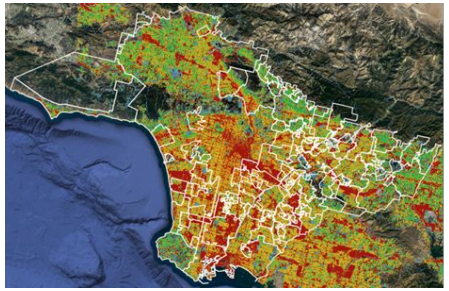
Supply Scenarios



Water Supply Characterization

GENERALIZED OVERVIEW OF CO-EVOLUTION OF MORPHOLOGY AND URBAN WATER DEMAND

Initial Conditions



Current demand

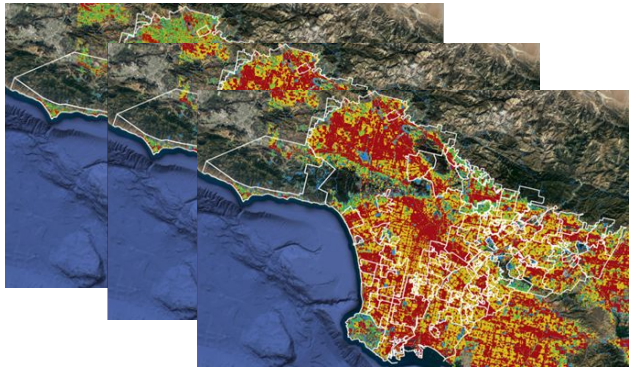
f(population, indoor efficiency, irrigated area, vegetation type, climate, laws/regulations)

ΔTime

Population
Regulations
Water supply
Socioeconomics

Factors influencing morphology

Future Potential Morphologies



Different morphology outcomes influence future outdoor demand

Research applications:

- Urban water security (requires integration with a water supply model)
- Better understanding evolution of regional multisectoral water demand
- Urban heat (tradeoffs between urban irrigation and urban heat)
- Cost-benefit analysis of difference regulatory or water supply scenarios

MODELING THE CO-EVOLUTION OF URBAN POPULATION, MORPHOLOGY, AND WATER DEMAND & SUPPLY

Challenges and Research Gaps:

Morphology

1. Urban morphology evolution under stagnating or declining population.
2. Urban growth/evolution projections that go beyond projecting development intensity. Expansion of current models or new downstream models.

Water supply

3. Data for parameterizing highly resolved representations of urban water supply & demand for case studies in other regions.
4. Better representing the evolution of institutional and infrastructural responses to demand growth & shifting water availability.
5. Constraining future water availability though modeling broader regional demand growth, water supply, and climate scenarios.