Improving Water Resource Management using an Integrated Modeling Framework

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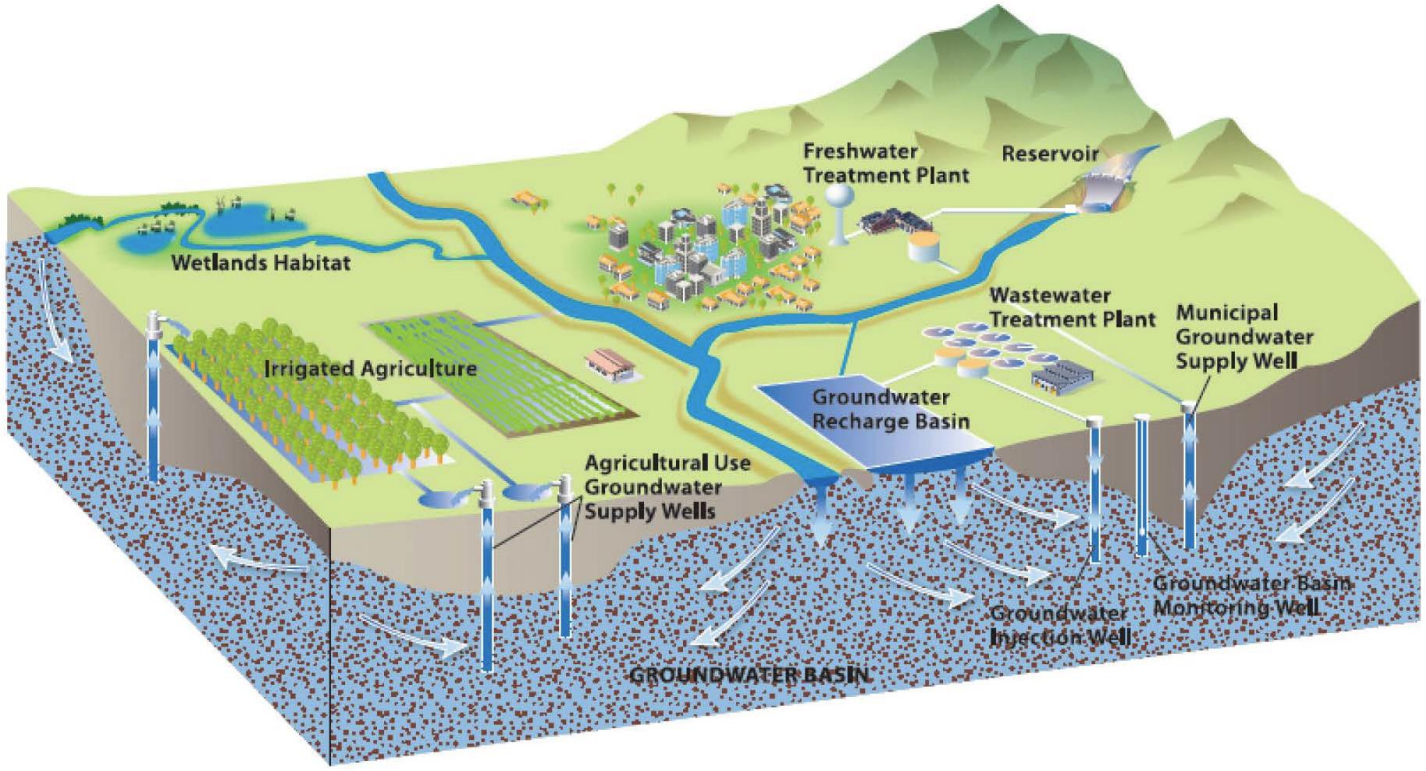
Salton Sea Summit **October 17th, 2019**




Water Resources Management:

The process of planning, developing, and managing water resources in terms of water quantity and quality across all water uses (World Bank, 2017).



Multifaceted Problem:

Land Subsidence

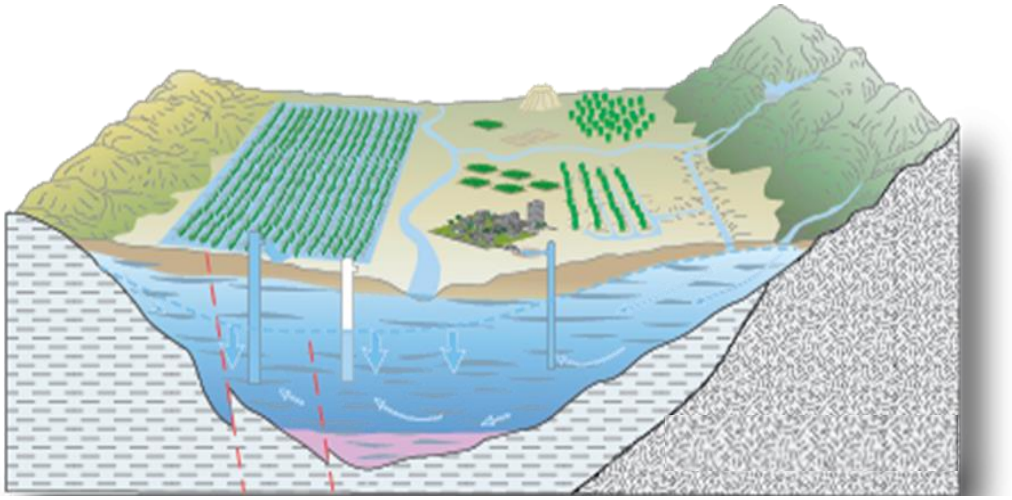
Food Production

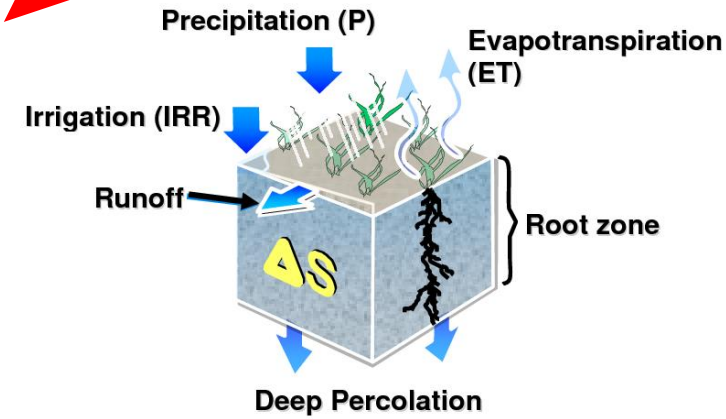
Environmental Flows

Legal considerations

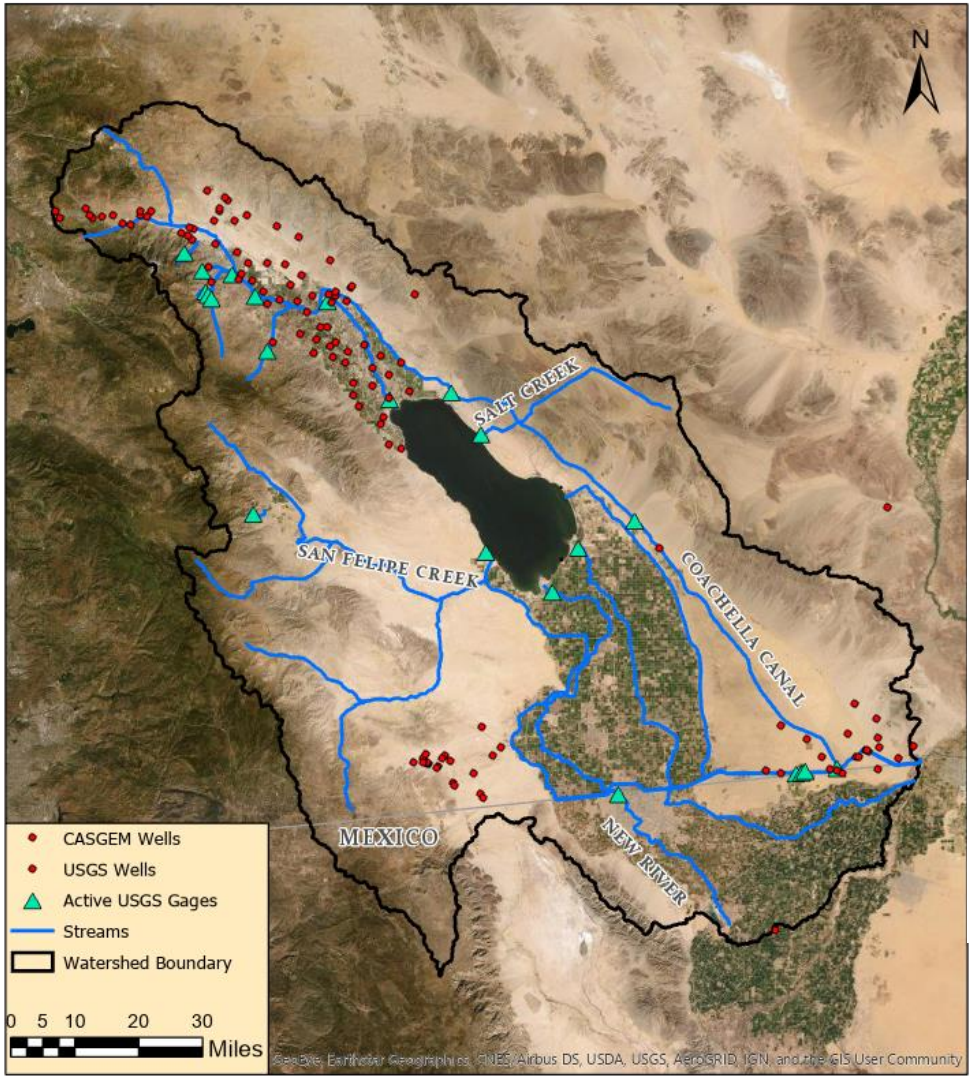
Economic considerations

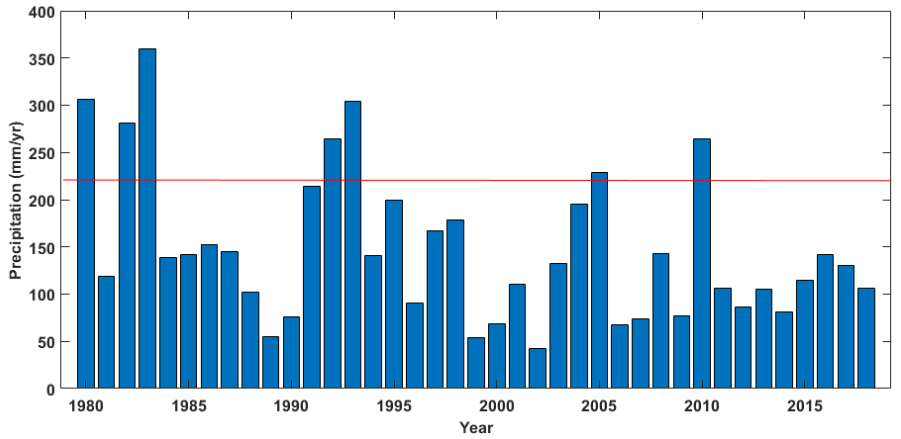
Quantifying Water Balance:

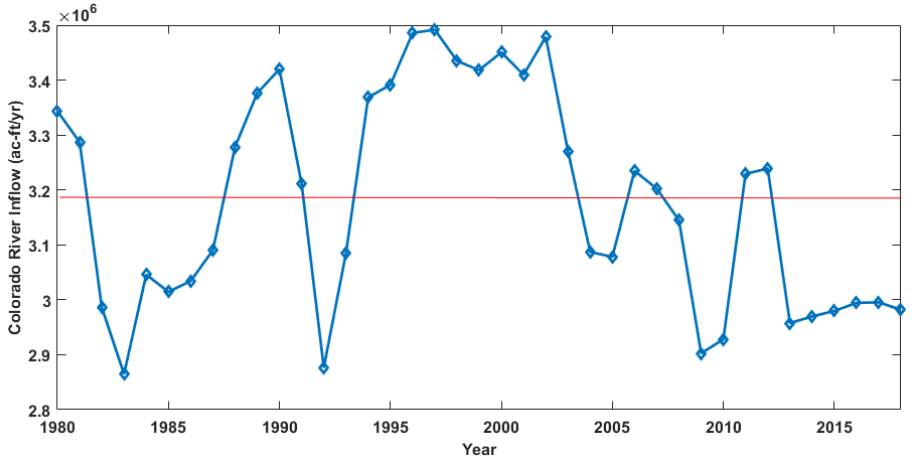




Salton Sea Basin:

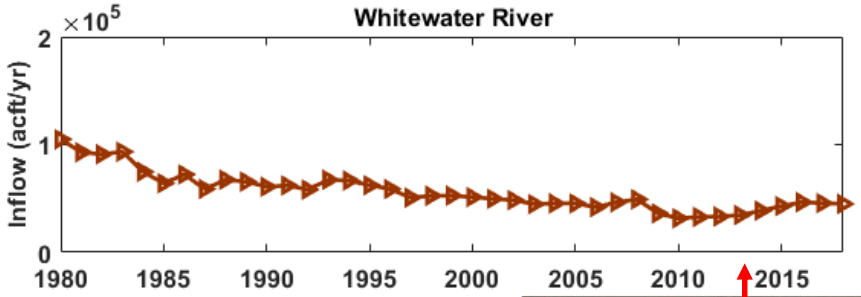






Area: 21,770 km^2

Current Condition:



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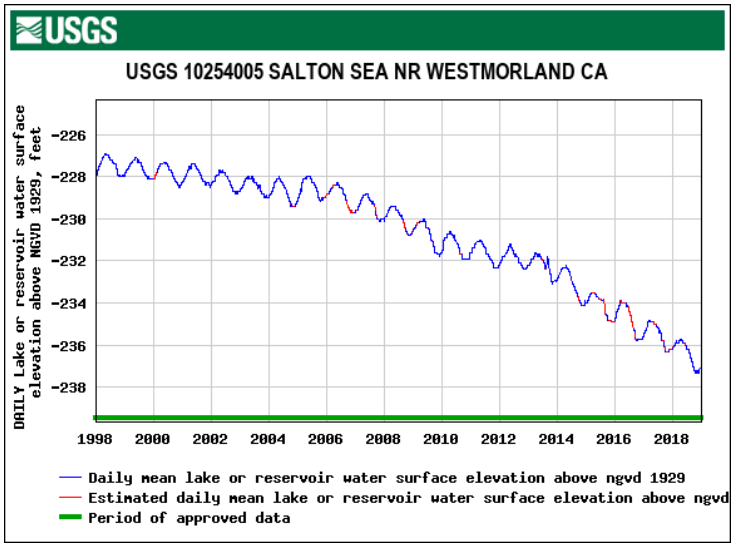
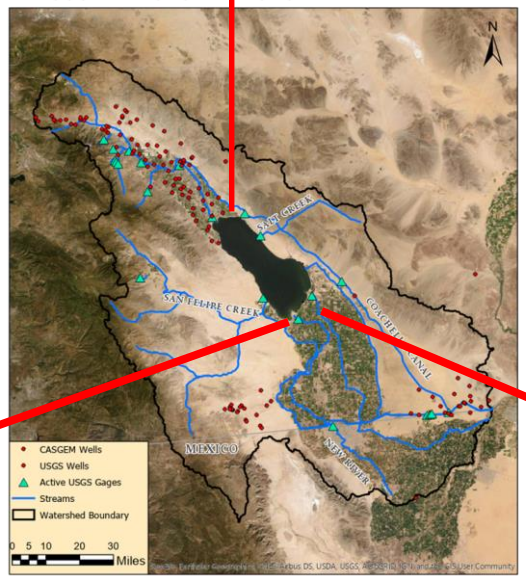
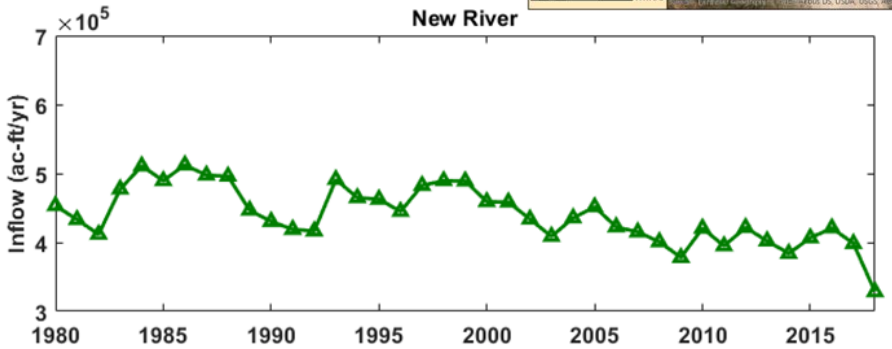
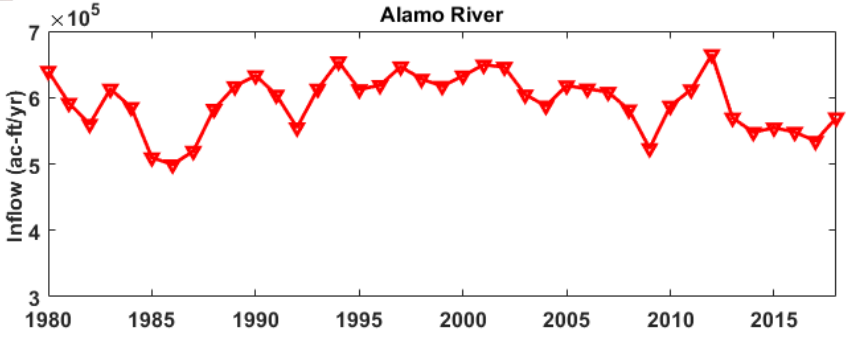


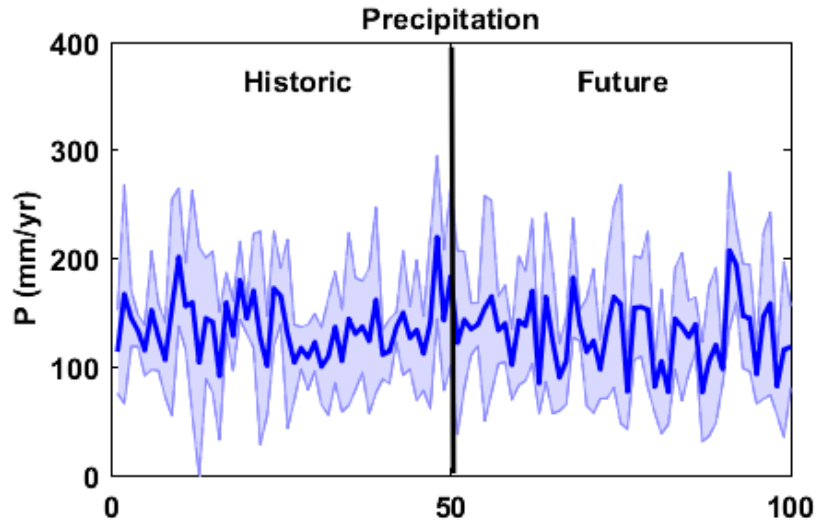


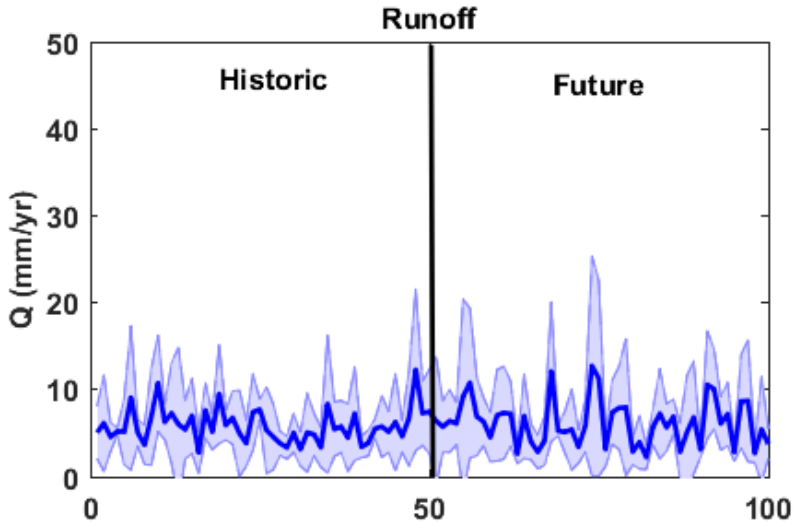




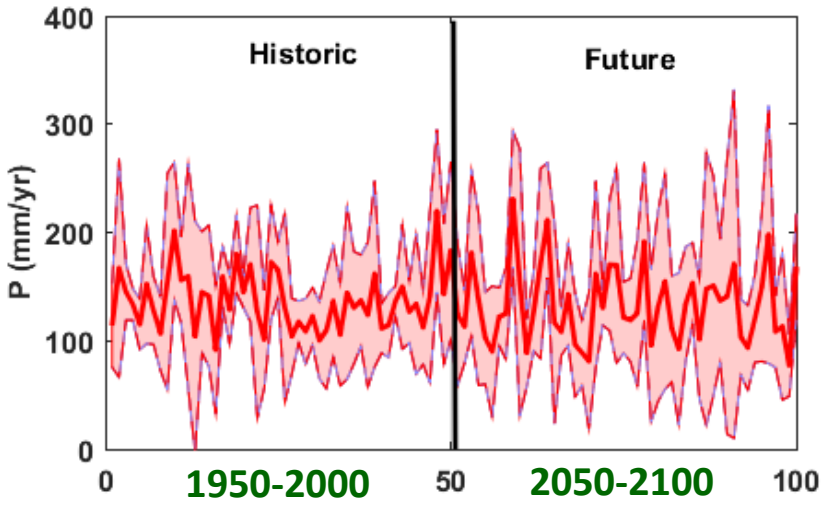
Plausible Futures under Natural Condition:

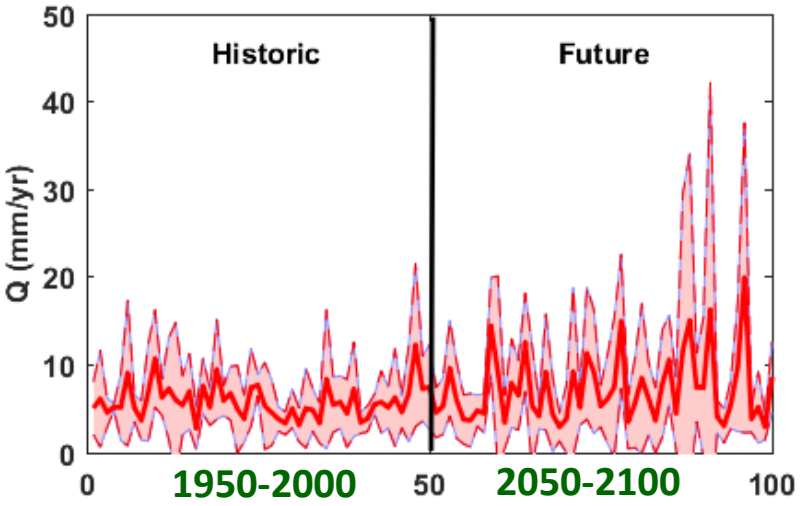
RCP 4.5





RCP 8.5



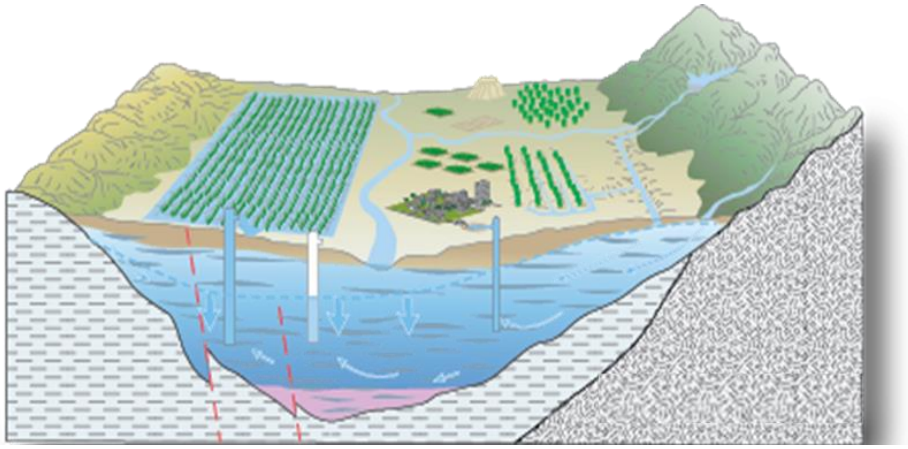


GFDL-CM3, CCSM4, CNRM-CM5, HadGCM-CC

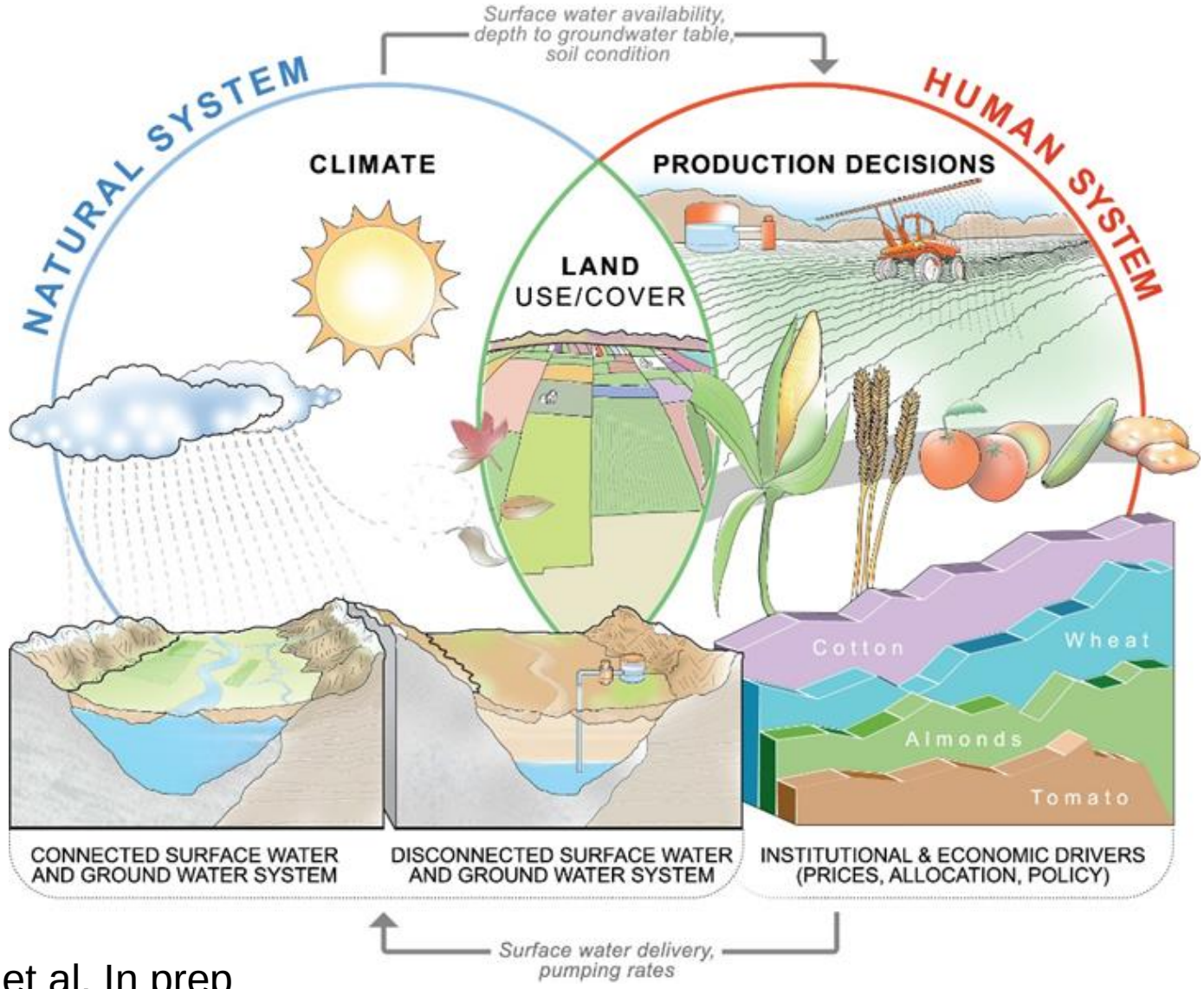
https://cal-adapt.org/

Limitations:

- Limited hydrometric observations are available across the basin
- Many existing modeling approaches do not consider coupled surface water and subsurface hydrologic processes
- Current VIC model simulations do not incorporate the impacts of management practices, irrigation types, and losses from the canals.



Future Outlook:



Ajami et al. In prep

INFEWS/T3: Decision Support for Water Stressed FEW Nexus Decisions

Kurt Schwabe, Economist
Laosheng Wu, Water Management Specialist
Hoori Ajami, Hydrologist

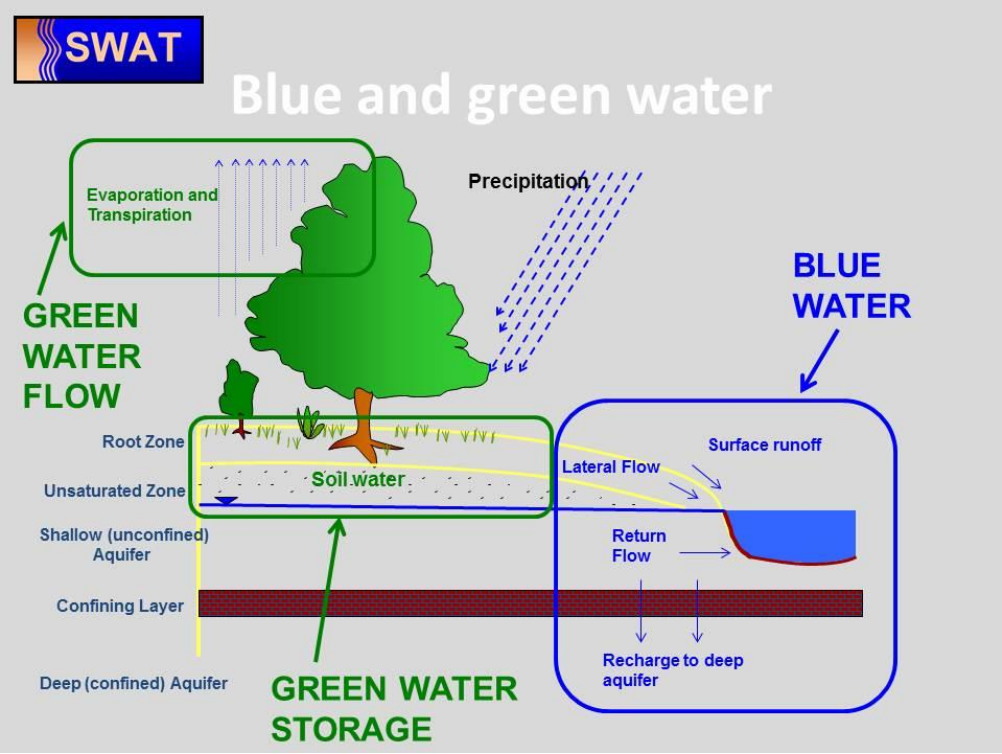
Texas A&M and UCR

Development of a coupled surface water-groundwater model.

The decision support system allows assessing the impacts of management and policy decisions on food, water, and energy availability.

Coupled SW-GW Model:

Soil and Water Assessment Tool



https://today.agrilife.org/wp-content/uploads/2011/05/SWATimage.jpg

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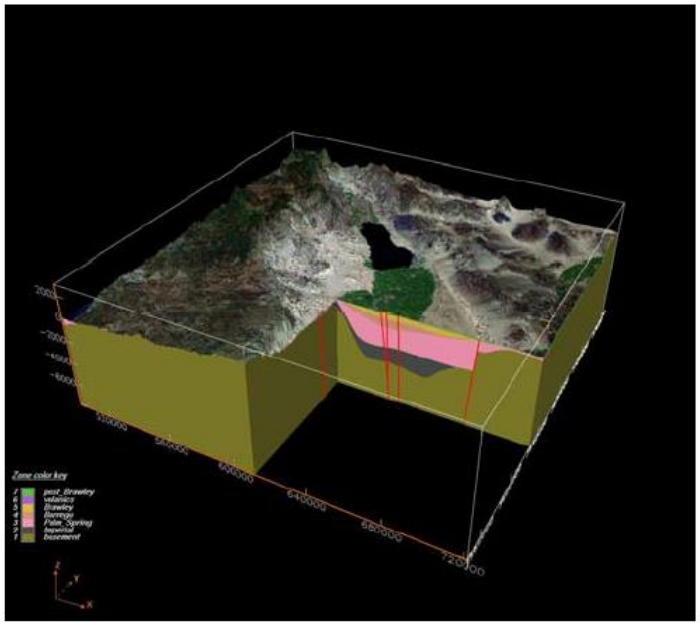
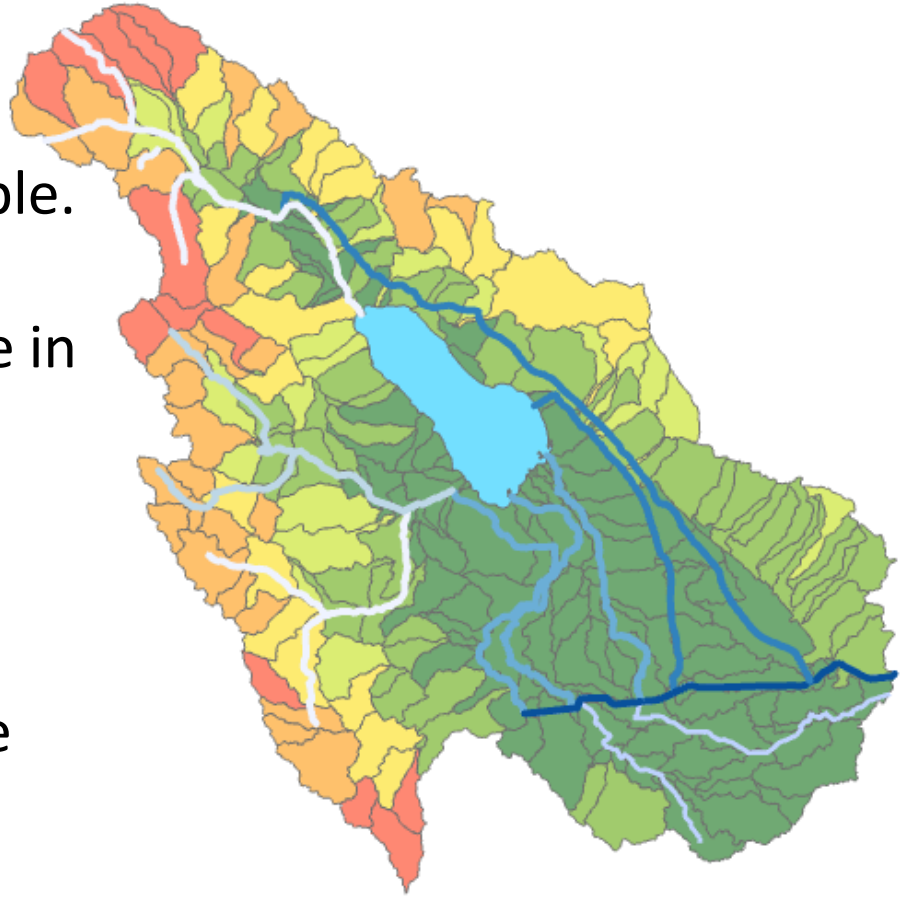
Groundwater Flow Model



Tompson et al.2004.LLNL

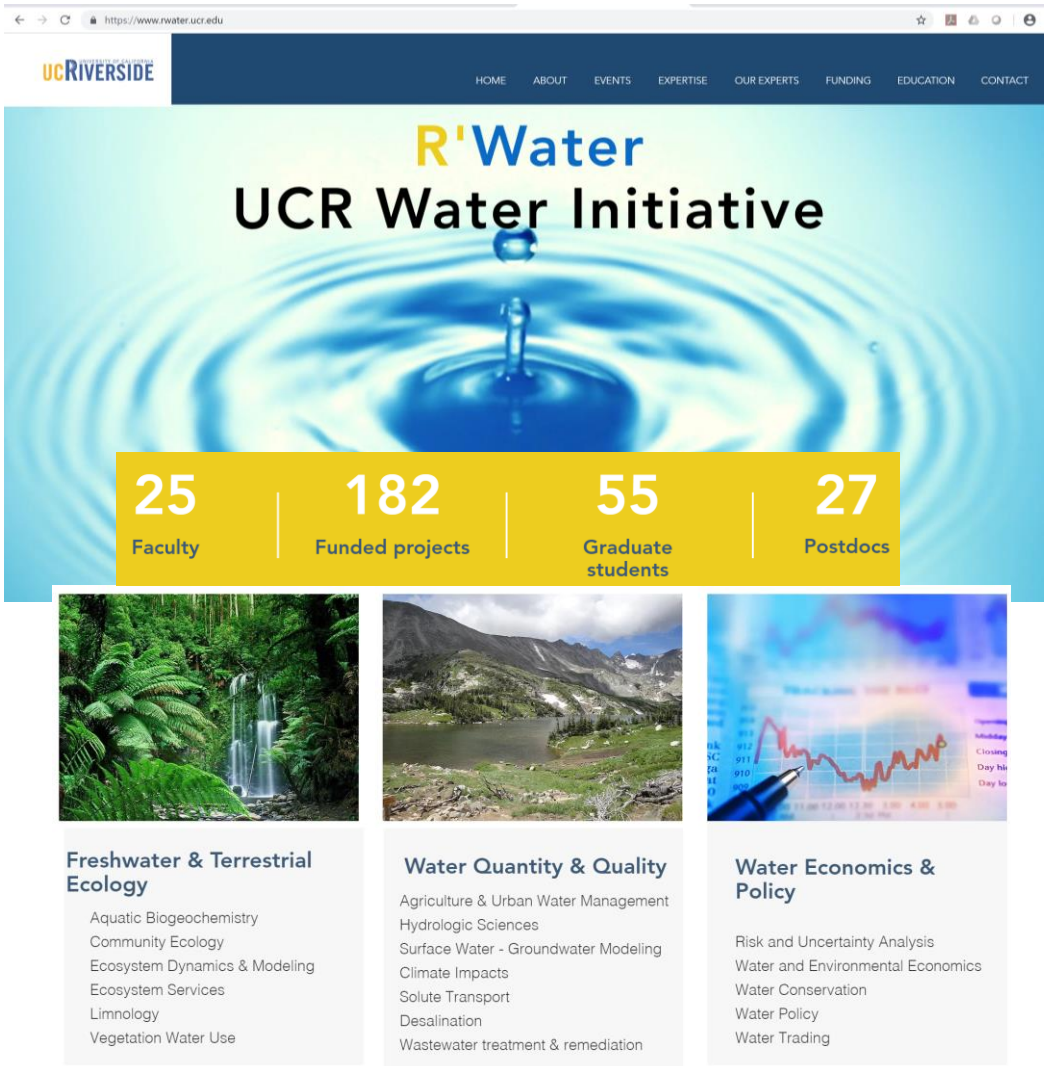
Sample SWAT Output:

- The modeling framework is flexible.
- Incorporates variability in climate in space and time
- Allows changing crop types
- Simulates surface and subsurface flows



Next Steps:

- Calibrate the model to match observations
- Update landcover types with time
- Simulate changes in lake levels and compute area of exposed playas
- Incorporate a physically-based groundwater module
- Design scenarios in discussions with stakeholders and perform model simulations based on downscaled climate inputs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