Whither are the thresholds of the Florida Urban Water System: Historical Replay in a Future World

The Team so far….

- Vasu Misra (FSU; Climate)
- Chris Coutts (FSU, Urban planning/Demography)
- Tatiana Borisova (UF, Water Economics/Extension)
- Jane (USF, Integrated Supply/demand modeling at WMD level)
- Tirusew (TBW, Integrated Supply/demand modeling at Utilitiy level)
- Lisette (UF, coordinator/keep us on track with stakeholders)
- Mike, Kevin, Rob, Alison (Stakeholders who will define the problem for us)

Overarching hypothesis

- In a changing and varying climate, the Florida urban water supply and demand system is accelerating to reach "thresholds" of demand exceeding supply if the supply system remains unchanged under rapidly increasing population and changing demography.
- Ancillary hypothesis: At the aggregate level (management district level) climate variability and change may be the drivers for reaching thresholds faster. But at finer scales (Public water utility level) demography may be the drivers for reaching the thresholds faster. **So in ignoring the changing climate at the WMD level, the urban water supply and demand system is being put in further strain.**

Methodology

- We replay “historical events” in a future world of 2030, 2070, and 2100
- Historical events will be defined by the stakeholders
- What are the thresholds?
- What is the uncertainty? What are the sources of the uncertainty?

FUTURE world: Changes in

i. Sea level rise rates,

ii. Wet season length decrease

Temperature mean / variances

iii. Extreme Events

iv. Aquifer level reductions

Natural System (Surface and ground water hydrology)

i) Aquifer levels / stream flows

ii) Water quality

iii) Seasonality

iv) Variance of weather and climate (droughts, flooding, etc.)

v) Sea level rise

Human System (Water supply and demand system)

i) Water demand

ii) Landuse Changes (Coastal/Inland)

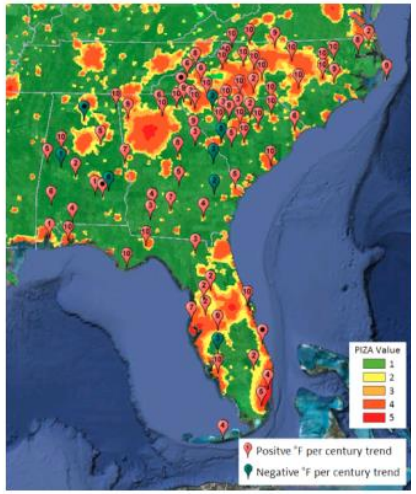
iii) Policies: water withdrawal and allocation

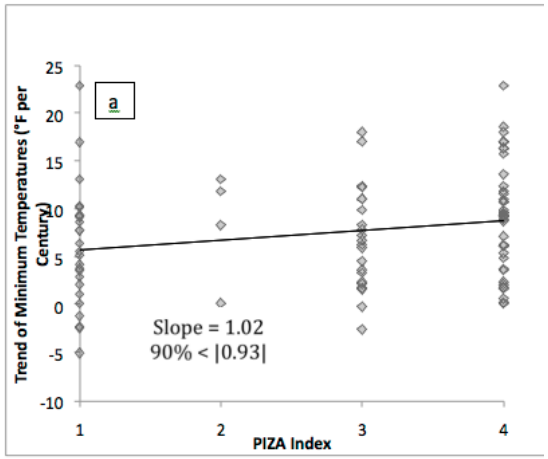
iv) Water suppliers: cost-recovery, conservation, and investments

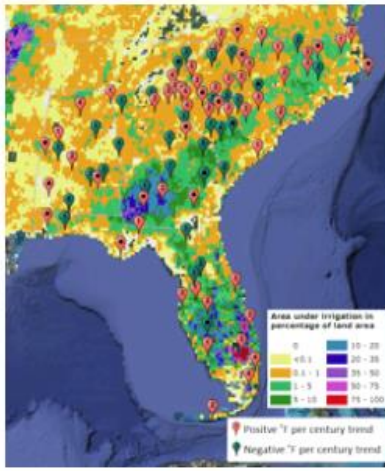
Water quality / runoff

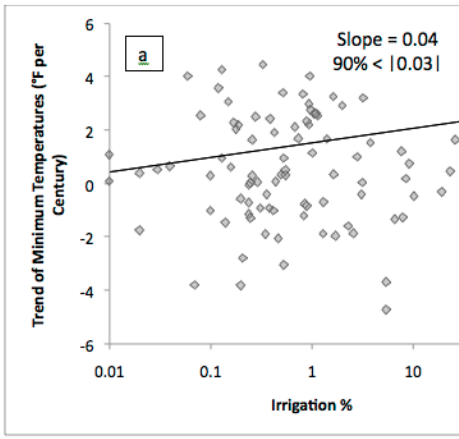
Water withdrawal rates

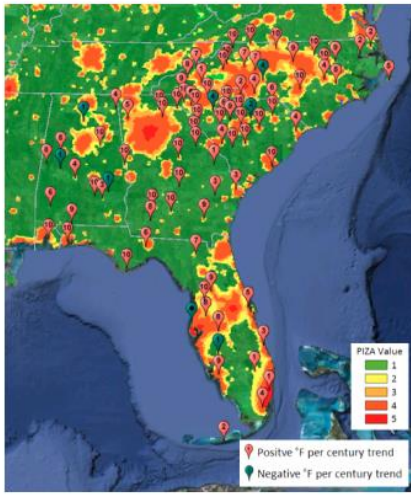
Meteorology

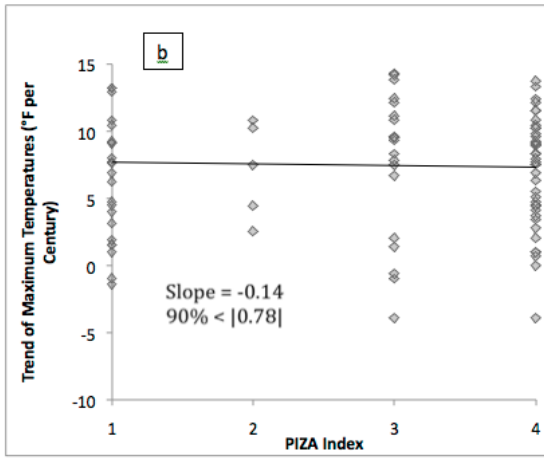


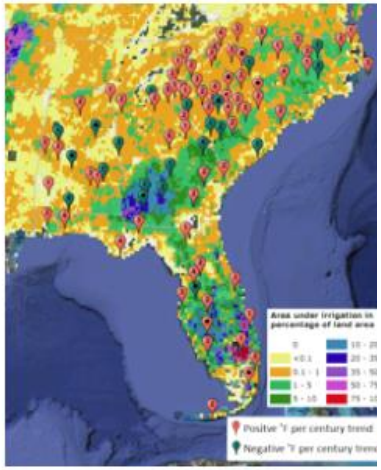


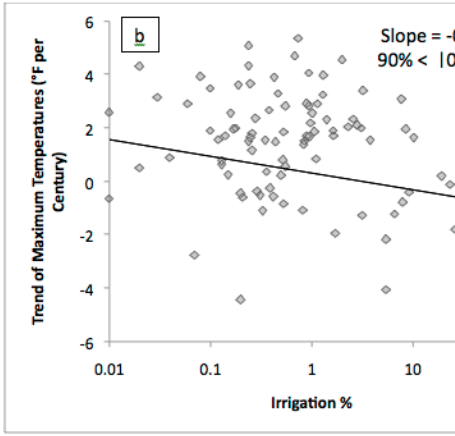






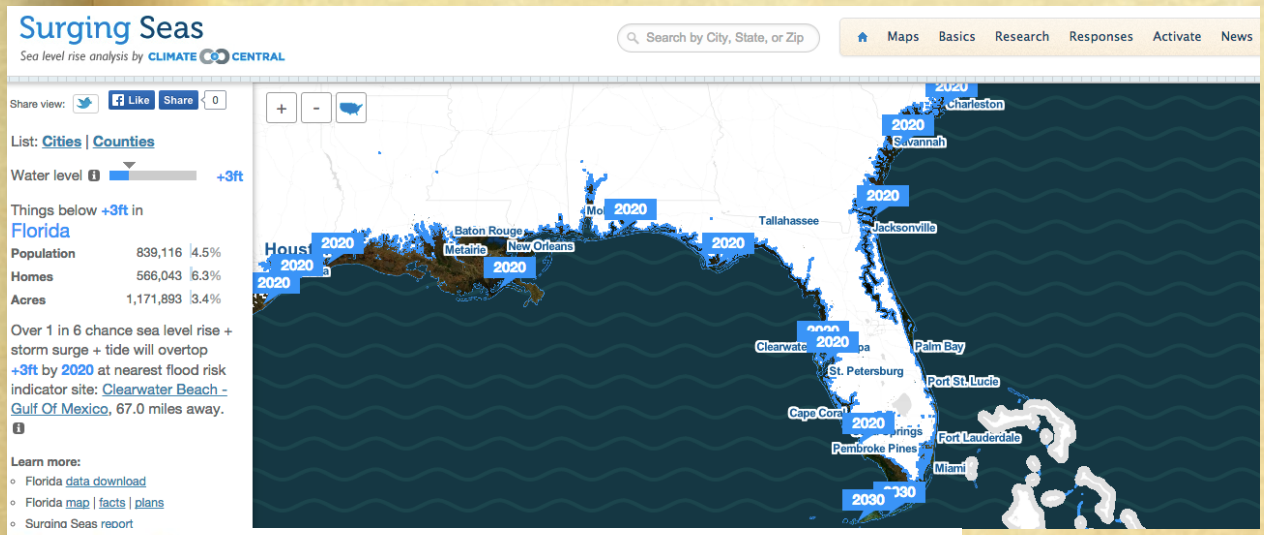


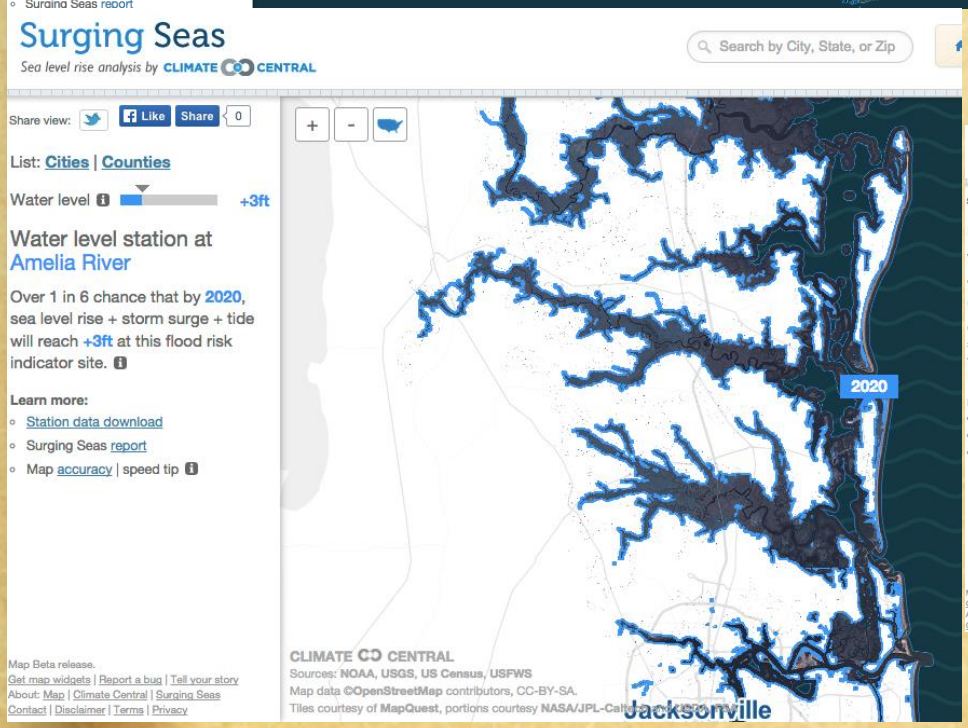


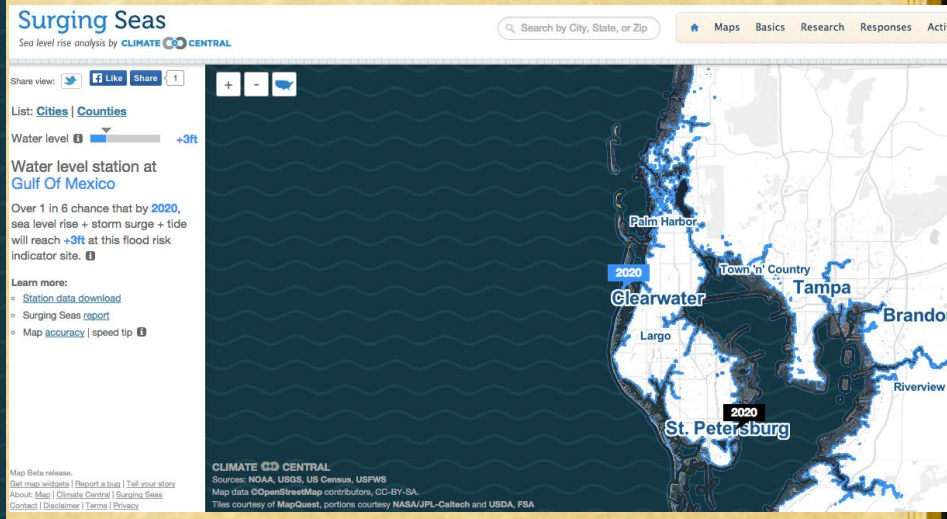


Temperature is affected by land cover and land use

The impact of 3ft sea level rise

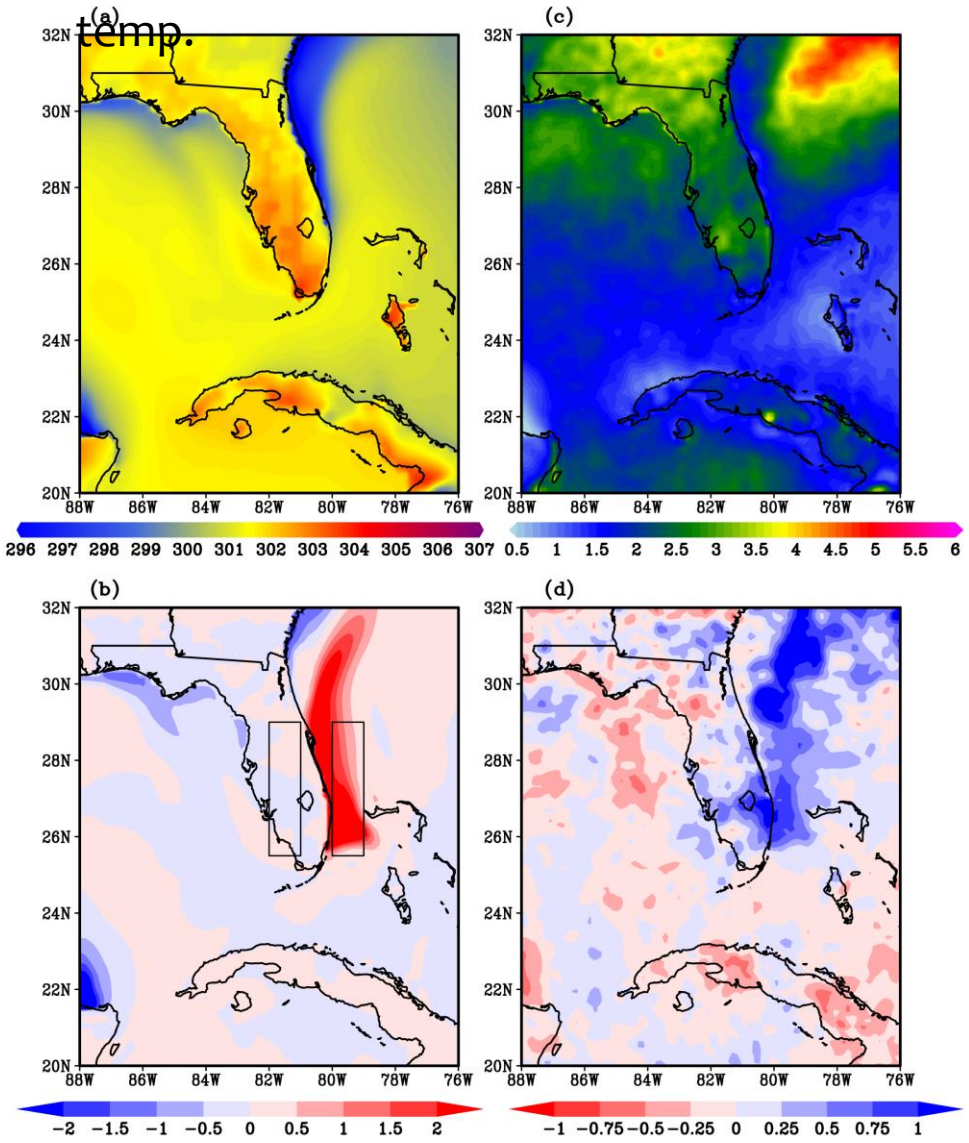






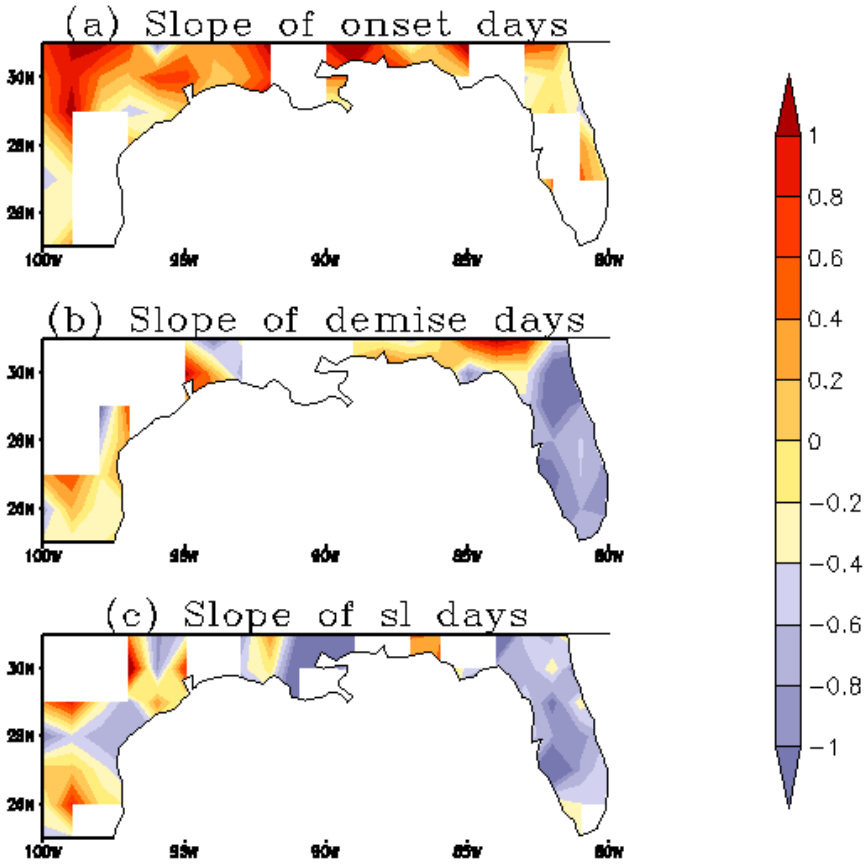
Sea surface temp.

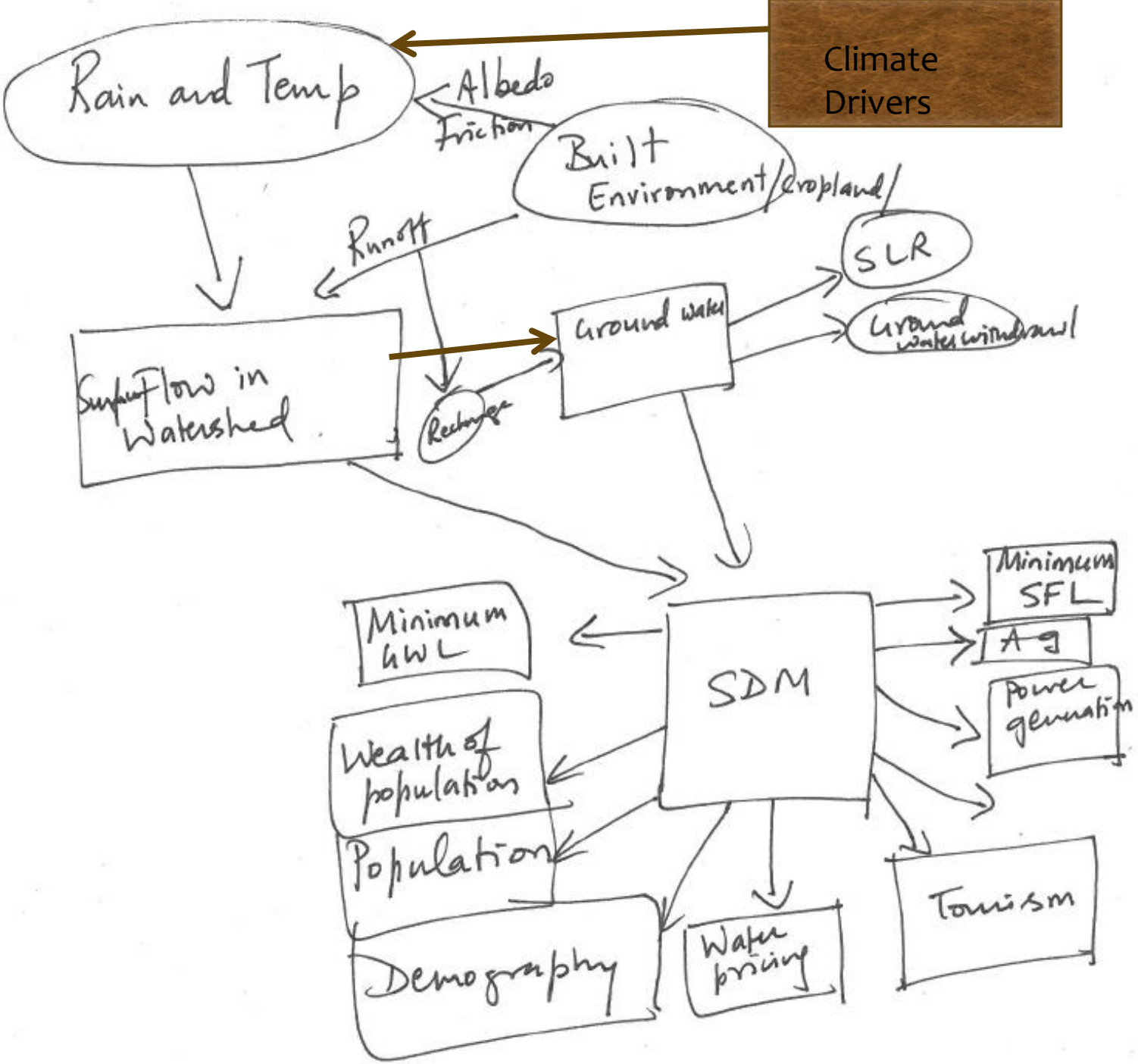
Rainfall



The impact of strength and position of Gulf Stream: When Gulf Stream stronger and closer to coast, there is more rain in peninsular Florida.

Length of the wet season on an average is reducing by about 0.25 days/year in the last 60 years of data.




Climate Drivers
Rain and Temp
Albedo
Friction
Built Environment/cropland/
Runoff
SLR
Ground water
Ground water withdrawl
Surface Flow in Watershed
Recharge
Minimum SFL
Minimum GWL
SDM
Power generation
Wealth of population
Population
Demography
Water pricing
Tourism

Missing links

- Ground water expert—sea water intrusion
- Hydrology: From Meteorology to flow in watershed
- Water quality
- Others?