

Resilient South Florida: Challenges in addressing Deep Uncertainty

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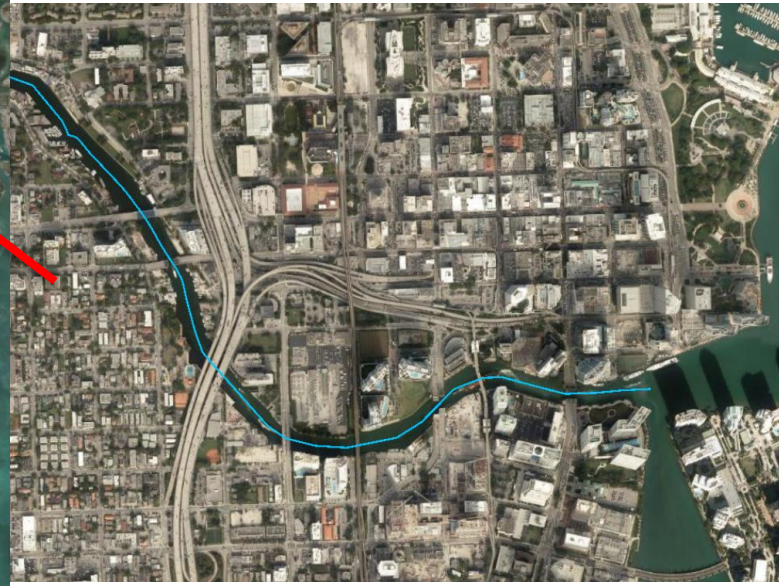
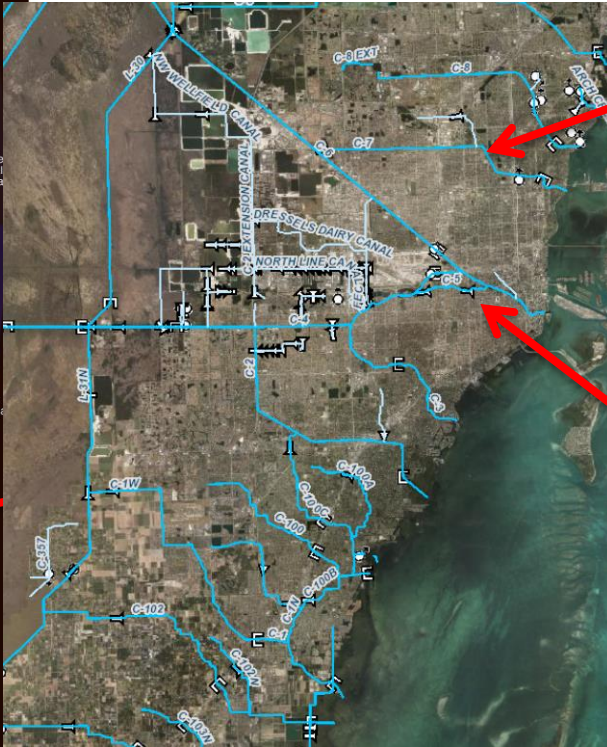
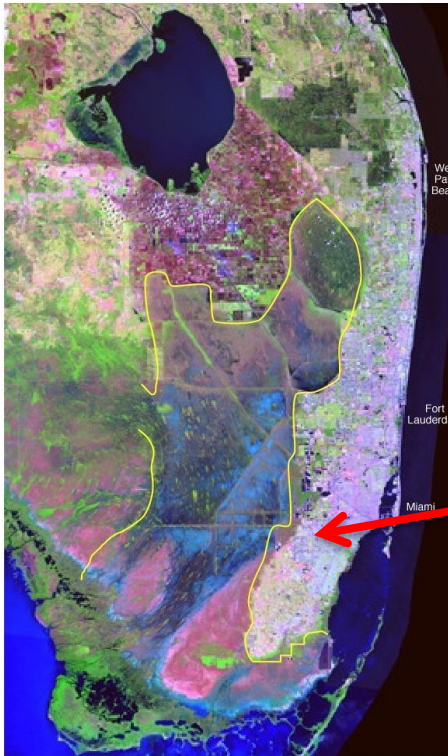
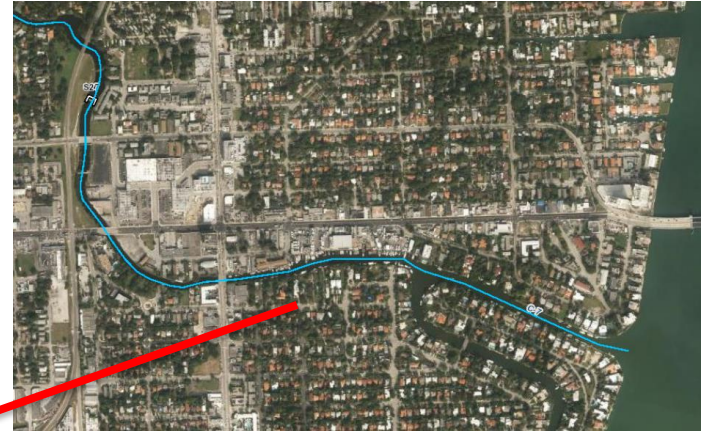
Acknowledgement

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- Jennifer Jurado (Broward)
- Katie Hagemann (Miami-Dade)

Project Setting

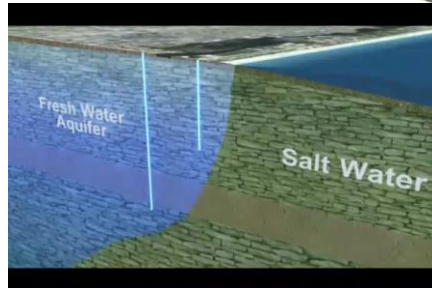
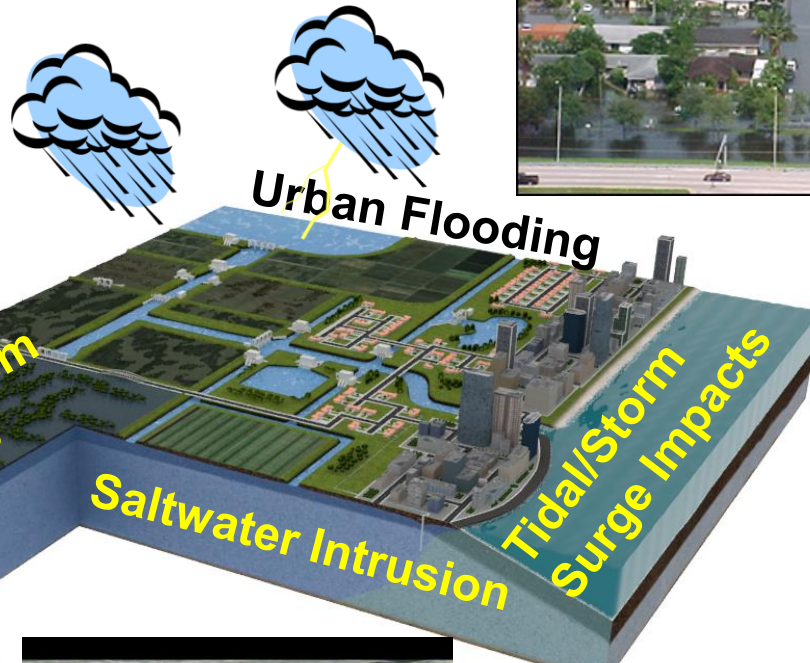
S. Florida: Low topography, High groundwater table, sandy soils and porous limestones, complex water management systems.



Climate Change Impacts

Drivers/Stressors:

- **Rising Seas**
- Increasing Temperature
- Change in rainfall patterns
- Changes in frequency and strength of hurricanes

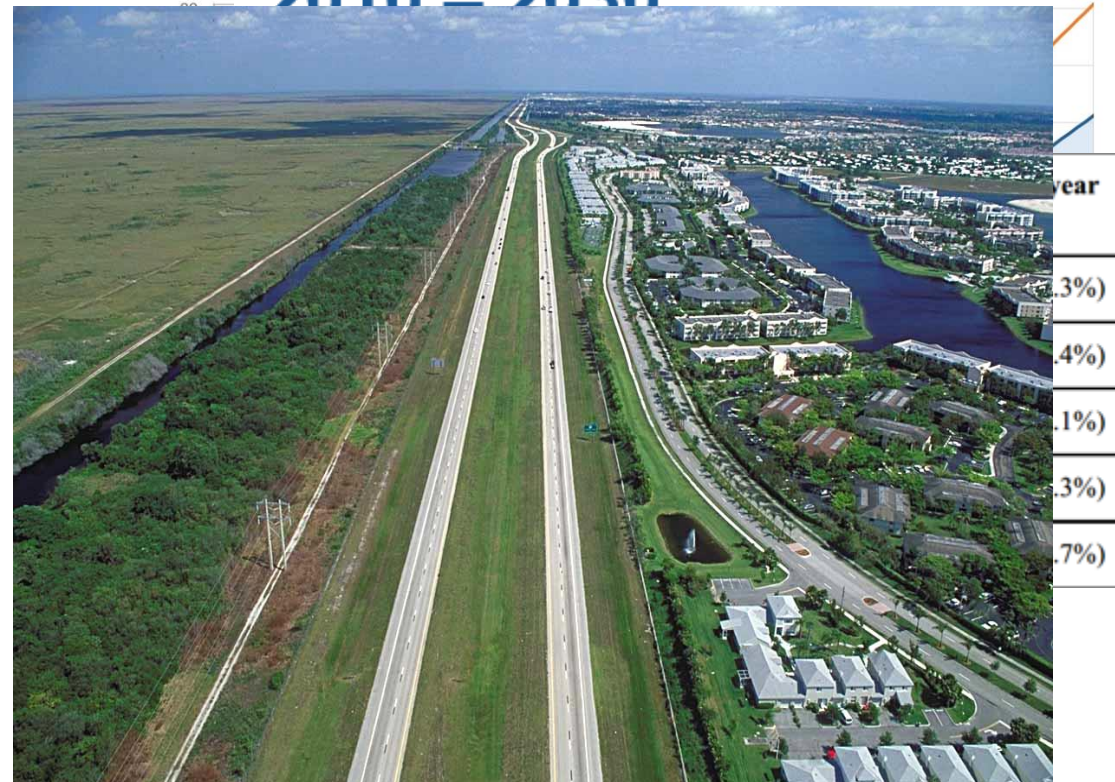


Sources of Deep Uncertainty

- Aleatory & Epistemic
- Socio-Economic
- Sea Level Rise
- Extreme Rainfall
- Complex Water Management System
- Governance



Planning Horizon
2010 – 2030



Adaptation Portfolio



Everglades Restoration

Impoundments & Pumps

Green Infrastructure

Revised Stormwater Permitting Criteria

Pre-storm Drawdown

Wellfield Relocation/
Interconnect/
Alternative Water Supply
(Reuse)

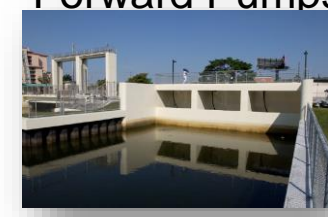
Water Conservation



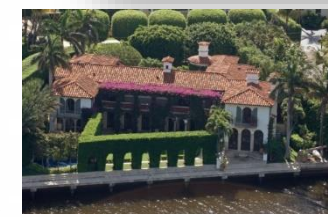
Water Storage

Levees/Elevated infrastructure

Forward Pumps



Seawalls/
Natural Barriers

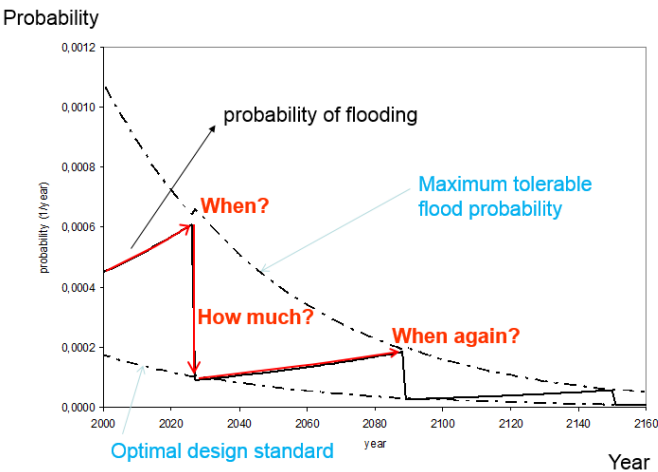
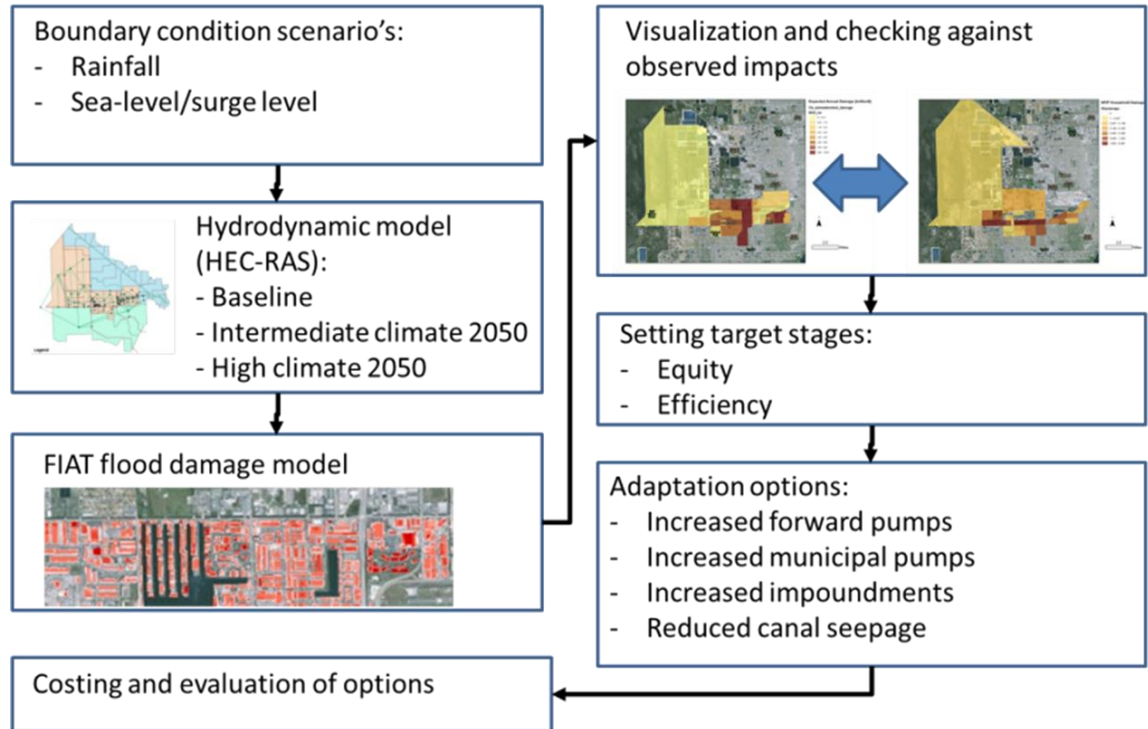


Flood Risk Management in Miami-Dade County (with Deltares)

- ❑ Determine optimal investment in flood risk reduction in the C-4 basin



Workflow:

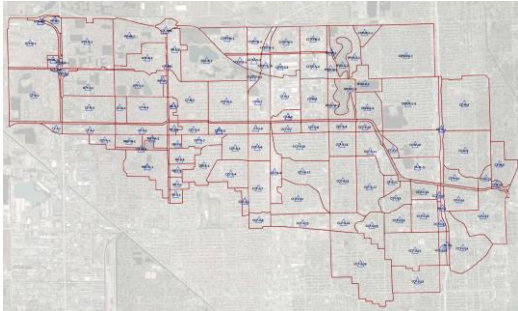


Lessons: (a) Hydraulic model + FIAT is useful for economic analysis of flood damages
 (b) Optimization model could not be pursued
 (c) Equity and Efficiency are useful concepts

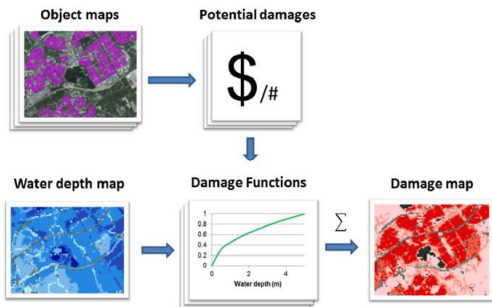
Flood Risk Management in Miami-Dade County (with Deltares) : C-7 basin

Hydrologic Drivers:
Rainfall; Storm Surge
Sea Level Rise

Hydrodynamic Model
XPSWMM



Delft-FIAT damage model

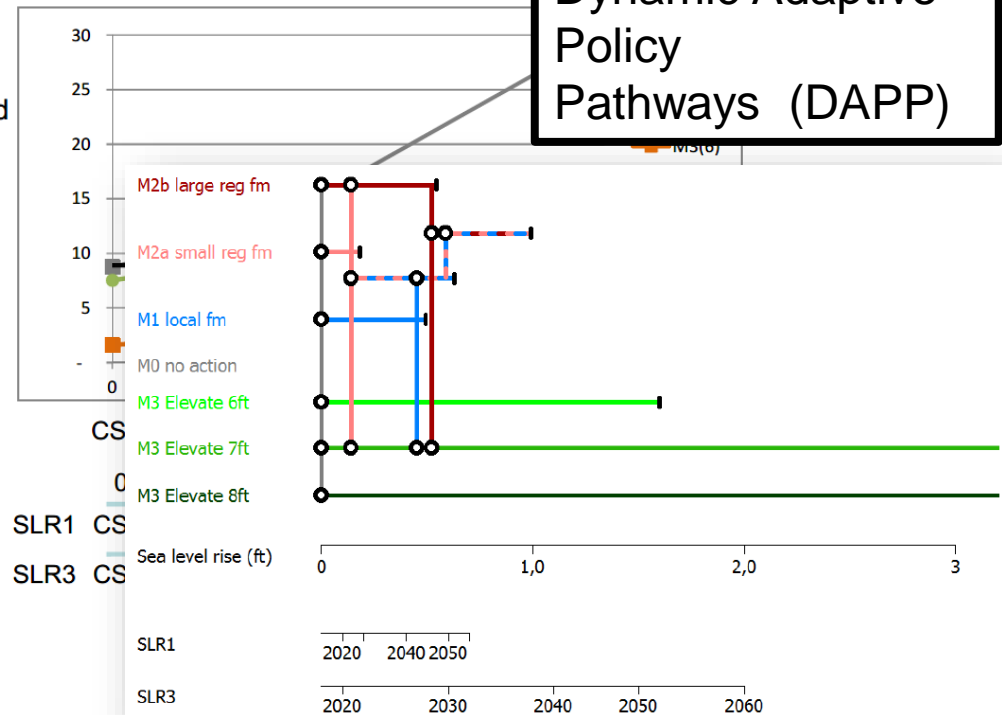


Adaptation Options:

- M1:Local Flood Mitigation (flood walls, pumps)
- M2:Regional Flood Mitigation (Forward pumping at outlet)
- M3:Land-use mitigation (elevate buildings, roads)

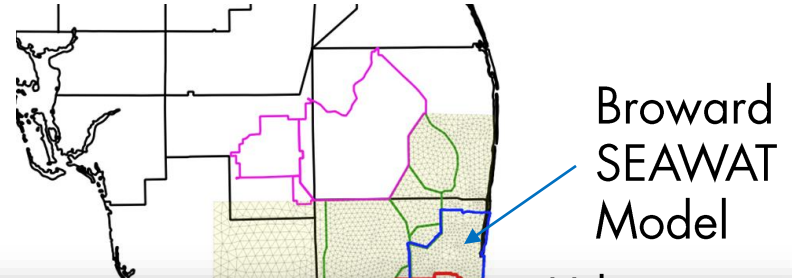
Dynamic Adaptive Policy Pathways (DAPP)

Expected Annual Damage (k\$)



Water Management and Adaptation Planning in South Florida (RAND Corp.)*

- Vulnerability of Miami-Dade (2.7M) and Broward Counties (1.9M) to groundwater inundation



Uncertainties (X)

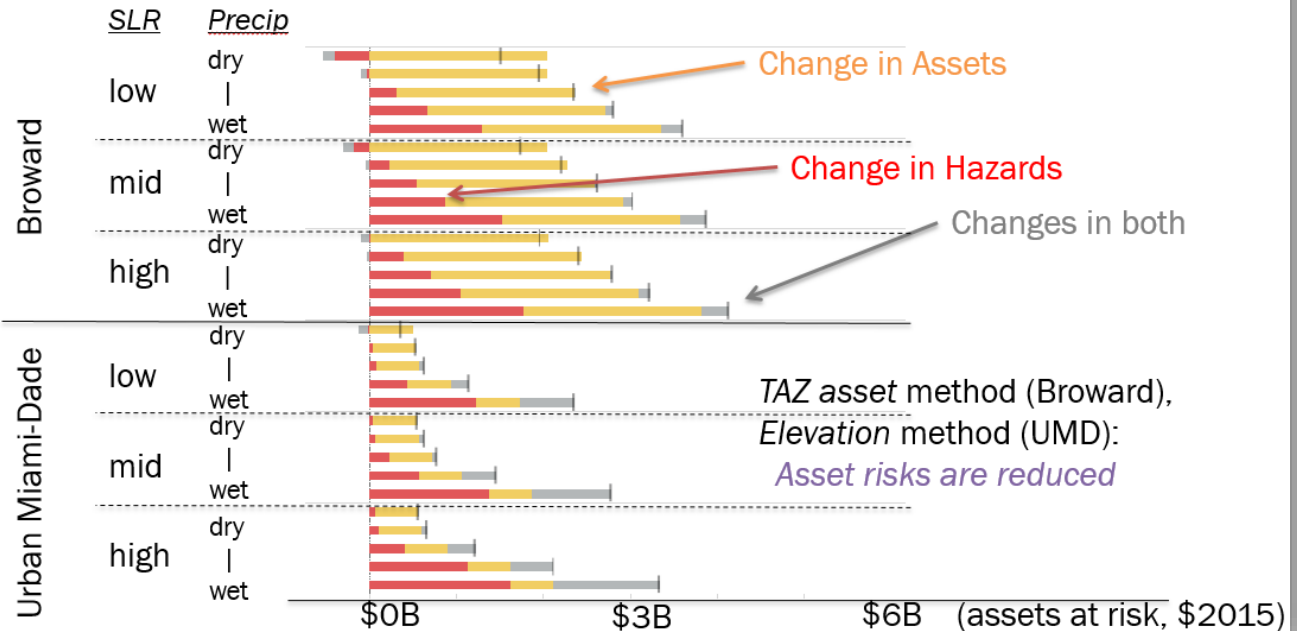
- Sea Level Rise (low, med, high)
- Rainfall (119 scenarios->5)
- Population (Random, Elevation, Traffic Analysis Zone)

Relationships

Groundwater models
Economic model

Levers (L)

Decomposition of risk changes to 2040-55 highlights key drivers (TAZ/elevation asset methods)



*Supported by MacArthur Foundation

Thank You!

