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Introduction

BACKGROUND:

- The Arch Creek Basin is characterized by low-lying topography and historic housing infrastructure, which over 80% were built pior to enforcing flood criteria (ULI, 2017).
- Flood risk is exacerbated by a rising water table caused by rain, tides, and sea level rise (Sukop et al., 2017). Conditions are expected to worsen due to climate change (SLSC, 2019).
- Miami-Dade County recently has experienced a paradigm shift on how to approach climate change and build more flood resilient communities with short-term adaptation and long-term mitigation strategies.

PROPOSED RESEARCH:

- Development of a holistic 2D hydraulic model able to simulate the complex interactions of fluvial, pluvial, and coastal flooding conditions: surface runoff, storm drain systems, coastal surge, and groundwater flow.
- the Evaluate potential OŤ coarser resolution models in urban settings to identify the maximum grid resolution thresholds (i.e. 10ft, 25ft, 50ft) for model optimization. County as a Case Study



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Building flood resilience through integrated 2D flood modeling: The case study of Arch Creek Basin

Methodology

The 2D dynamic flood routing model for open channel hydraulics and unconfined overland flow FLO-2D (O'Brien, 1993) can coupled: • 1D Pipe hydraulics: **EPA SWMM** (Rossman, 2009) • 3D Groundwater conditions: **MODFLOW-2005** (Harbaugh, 2005)

STREET FLOW BRIDGE BUILDINGS CHANNEL-AND FLOW OBSTRUCTION HUD AND DEBRIS OVERLAND FLOOD ROUTING CROSS SECTION VARIABLE AREA CROSS SECTIONS LEVEES CROSS SECTION CHANNEL FLOW ROUTING



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Results and Opportunities

• This research investigates the development of a coupled 2D hydraulic model that captures the complete picture of flooding due to rainfall, storm surge, and sea level rise using a 50ft grid resolution.

• This research can set the foundation to investigate the ripple effects of flooding in multidisciplinary fields (i.e. socio-economic costs, performance of structural measures, septic tanks, urban and ecological degradation).

References

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Figure 1: Flooding levels Arch Creek Basin