

Enhancing Hurricane Loss Modeling and Inventory Development for Mobile and Manufactured Homes.

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Introduction

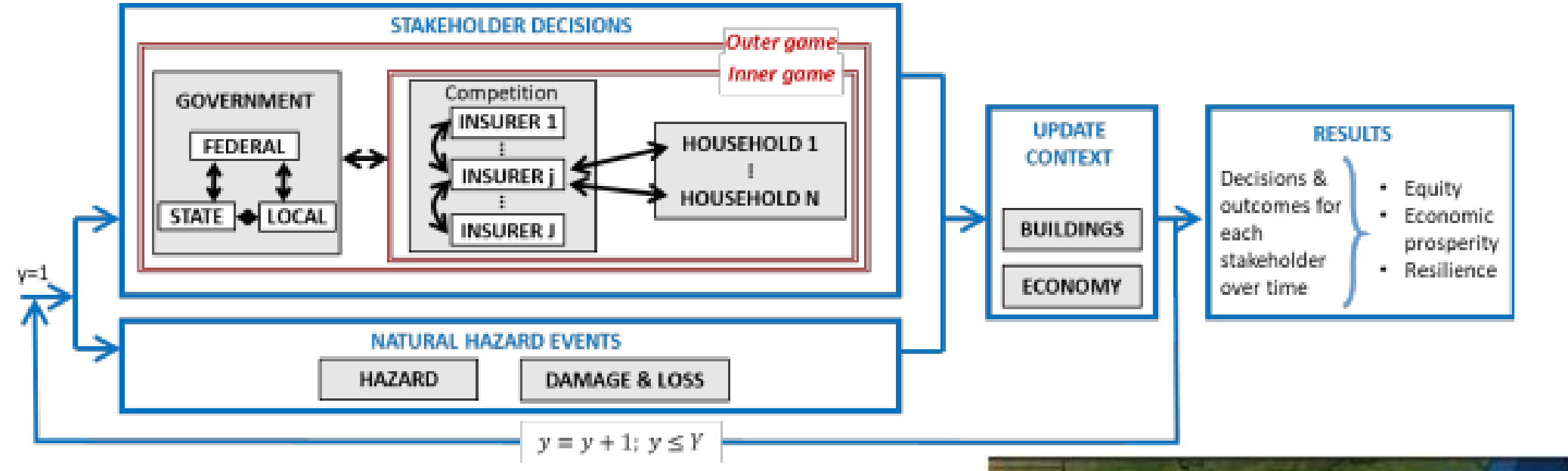
- Hurricanes produce billions of dollars in property and other economic losses annually in the United States.
- Mobile manufactured homes represent a unique category of residential property that is distinct from traditional single-family detached houses.
- In the United States, more than 20 million people reside in mobile manufactured homes.
- While several post-damage reports exist in the public domain, there are few damage prediction models available for public review.



Manufactured Housing Institute, 2023

Purpose & Research Question

- This work looks at estimating losses to mobile manufactured homes from hurricane as part of the Stakeholder-based Tool for the Analysis of Regional Risk (STARR).
- STARR is a computational model that incorporates decision-making among key disaster management stakeholders in response to a series of hurricane scenarios. It will serve as a tool for policy-makers and relevant stakeholders to assist in hurricane risk management planning.
- Requires understanding properties risks and retrofit opportunities, and further delve into how main stakeholders make decisions and how they interact.



Davidson et al., 2024

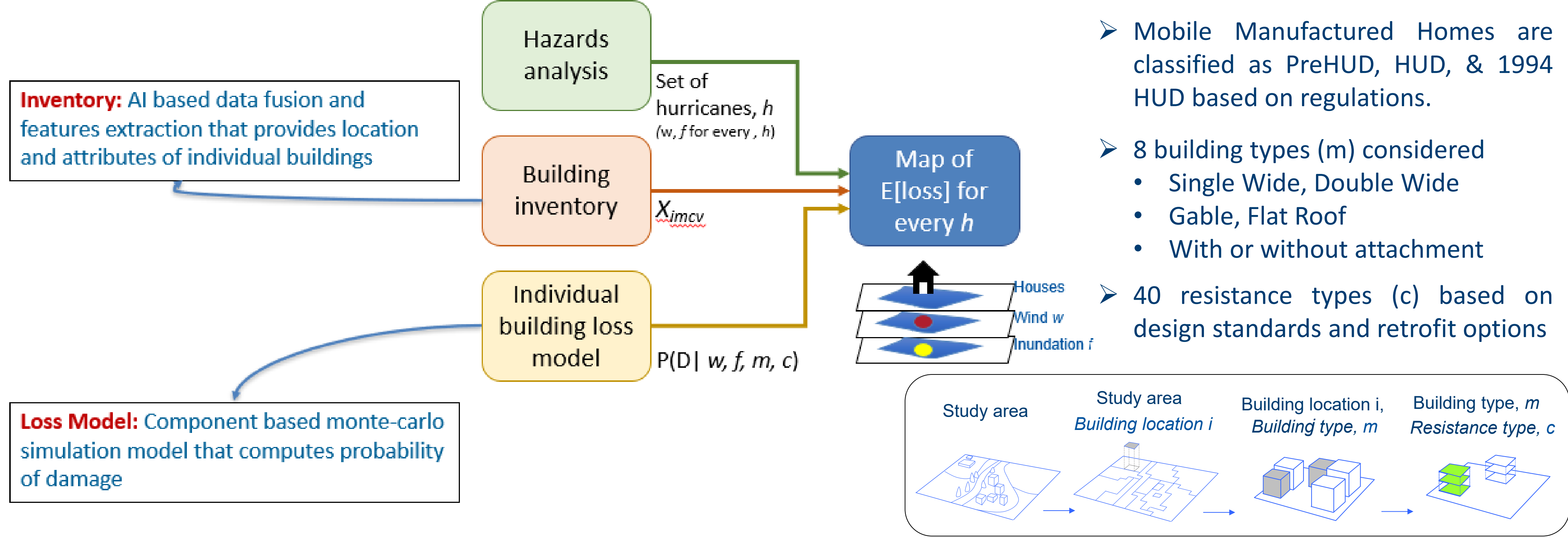


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Subjects, Methods & Analysis

- This study intends to include probability of damage and loss to mobile manufactured homes from a given hurricane with wind, flood, and building characteristics in the study area, Eastern North Carolina, Port Arthur,, and Houston, TX.



- Overall Approach: Component based probabilistic estimation. Compares components resistances to hazard metrics. Uses Monte-Carlo simulation.
- Hazard Metrics: Wind (3-sec peak gust wind speed in m/s (w) and coastal flooding (max inundation depth in m (f))
- Component Damage: Model Samples 3000 vectors of component resistance using Latin Hypercube Sampling.
- Component resistances for each components assigned a variable which changes from one level to other representing retrofit strategies.
- Component failure modes for mobile manufactured homes include Roof Cover (RC) loss, Roof Sheathing (RS) loss, Openings (O), Roof to Wall Connection (RWC), Floor to Foundation Connection (Sliding & Overturning), Flood susceptibility (F).
- Retrofits represents one building resistance level c to another c' . For instance, window openings could be regular windows(1), shutters (2)

c	RC	Wind			Flood	
		RS	RWC	O	W	F
1	1	1	1	1	1	1
2	1	1	1	1	2	1
3	1	1	1	2	1	1
4	1	1	1	2	2	1
192	2	2	2	3	2	4

Jiazhen, 2013



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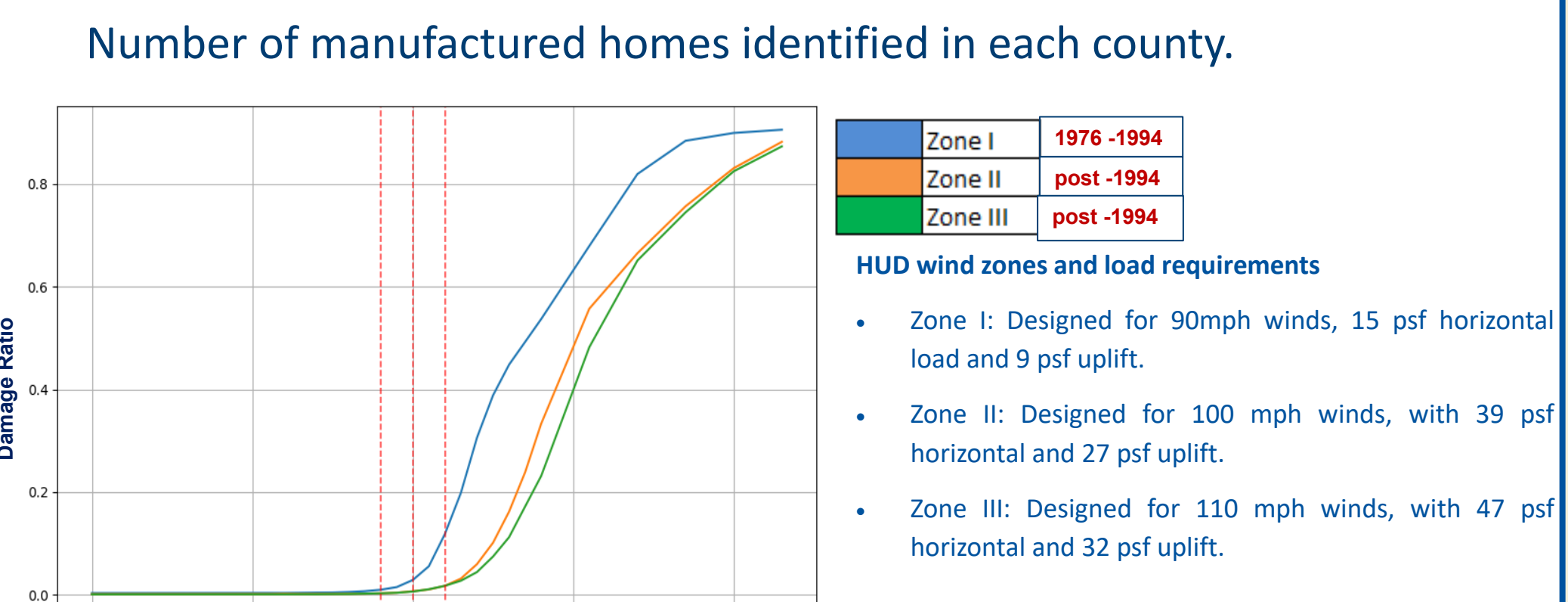
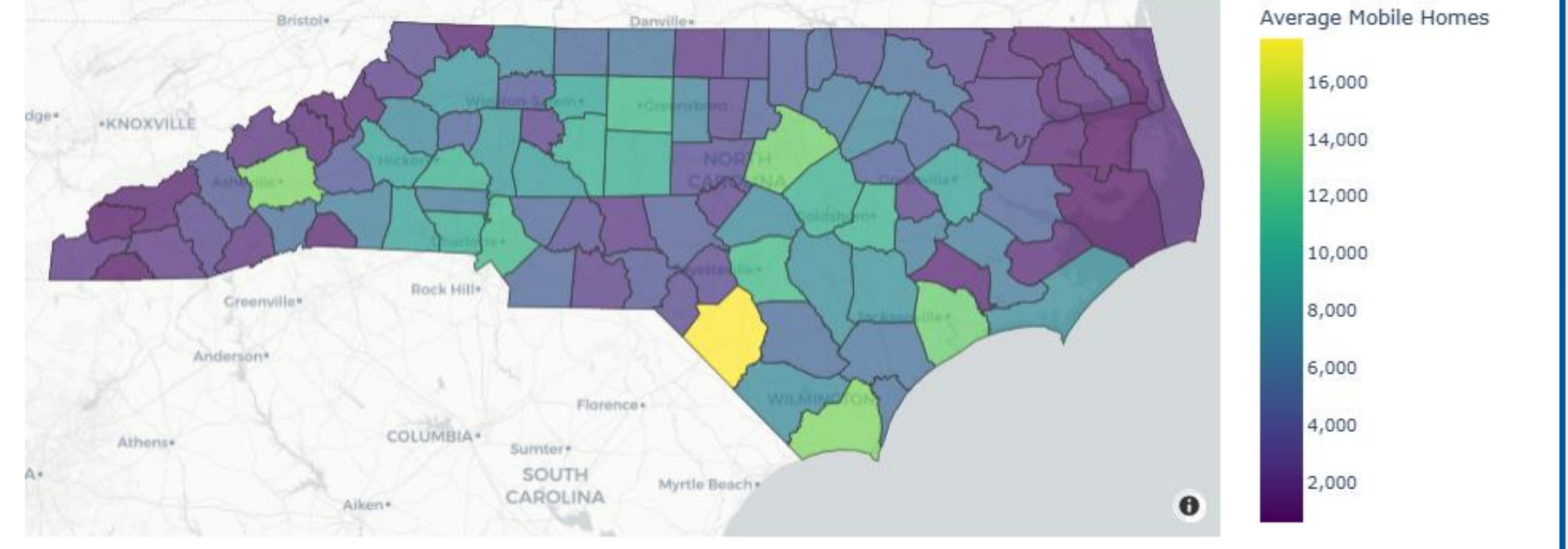
Conclusions

- A comprehensive disaster risk assessment involves understanding the loss distribution across different geographical areas and building types including mobile manufactured homes with unique vulnerabilities.
- Multiple stakeholders, including homeowners, insurers, reinsurers, and governments, each have their own objectives, alternatives, and constraints.
- Recognizing these perspectives is important for an effective disaster risk management system.
- Including mobile homes improves risk assessment, retrofit planning and stakeholder decision making.
- Decision models in subsequent sections rely on values for the percentage of buildings in each area unit, building category, and resistance level that will experience a particular damage state during a given hurricane scenario.
- Overall, this work improves understanding of how insurance and retrofit strategies can reduce disaster risk.



Sutley et al., 2020

Preliminary Results



Comparing model vulnerability curve with HUD standards.

Kindly scan barcode to say up to date with our research.

