INCORPORATING HOUSEHOLD-LEVEL SUSCEPTIBILITIES AND CAPACITIES IN FLOOD RISK

Institute for Resilient Infrastructure Systems
UNIVERSITY OF GEORGIA

Haley Selsor and Brian Bledsoe, PhD
School of Environmental, Civil, Agricultural, and Mechanical Engineering
University of Georgia, Athens, GA
UGA Water Science and Policy Poster Symposium: October 20, 2023; Contact: hks47033@uga.edu

US Army Corps of Engineers.

EWN Engineering With Nature

INTRODUCTION:

- Floods are one of the most costly and frequent natural disasters facing the United States, but communities are not impacted equally as socially vulnerable communities are more likely to live in flood prone areas.[1,2]
- Conducted a review of conceptualizations of flood risk assessments that include social vulnerability with physical exposure.
- Found that conceptualizations do not commonly consider time in their analysis.
- Define social vulnerability as society's *susceptibility* to impacts and *capacity* to respond, recover, and adapt from hazards.
- Objective: to develop and apply a framework to assess flood risk at the household level

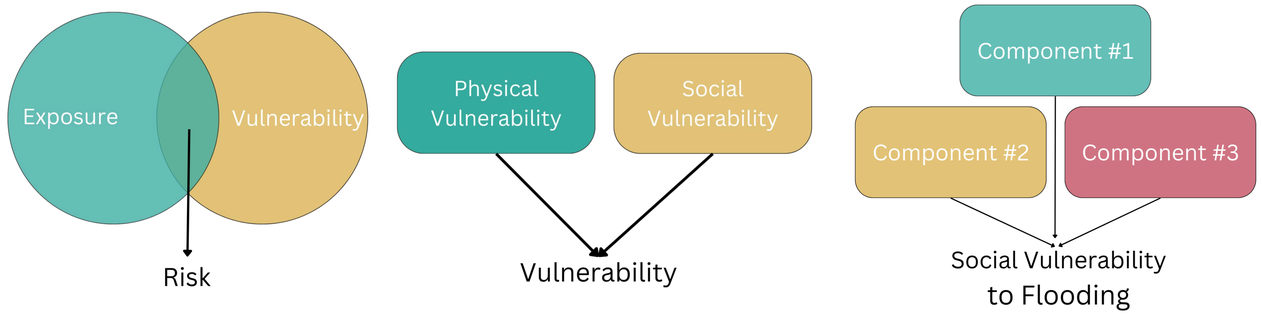

Figure 1 – The three main conceptual models used by authors in the review to pair physical flood exposure with social vulnerability in their flood risk assessment.

APPLICATION OF FRAMEWORK

Study area: Athens-Clarke County, Georgia

Assessing Capacity:

- Method – online survey and resident interviews
- Will assess resources (social, financial, knowledge), willingness, and perception.
- This approach assess psycho-social characteristics and the resources necessary to recover beyond socio-demographic characteristics that are typically used to assess social vulnerability.

Assessing susceptibility:

- Will assess how inundated areas impacts access to grocery stores, hospitals, schools, etc.
- This portion of the analysis includes cross-scale interactions by depicting how larger community level disruptions (i.e., transportation systems) impact household ability to recover.

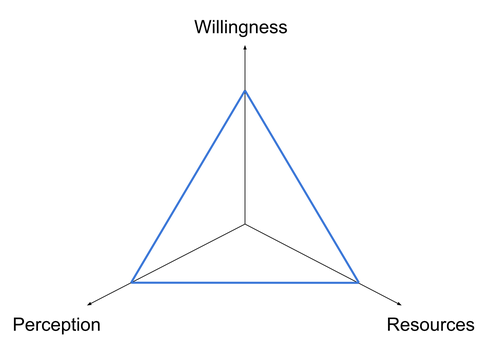

Figure 3 – The three determinants of adaptive capacity.

FLOOD RESILIENCE FRAMEWORK:

- Developed a framework specific to flooding that considers physical and social system over time to assess vulnerability to flooding.
- By including time, we can consider disparities in the recovery process as well as disparities in exposure.
- Can be applied to multiple scales (e.g., households, city, etc.).

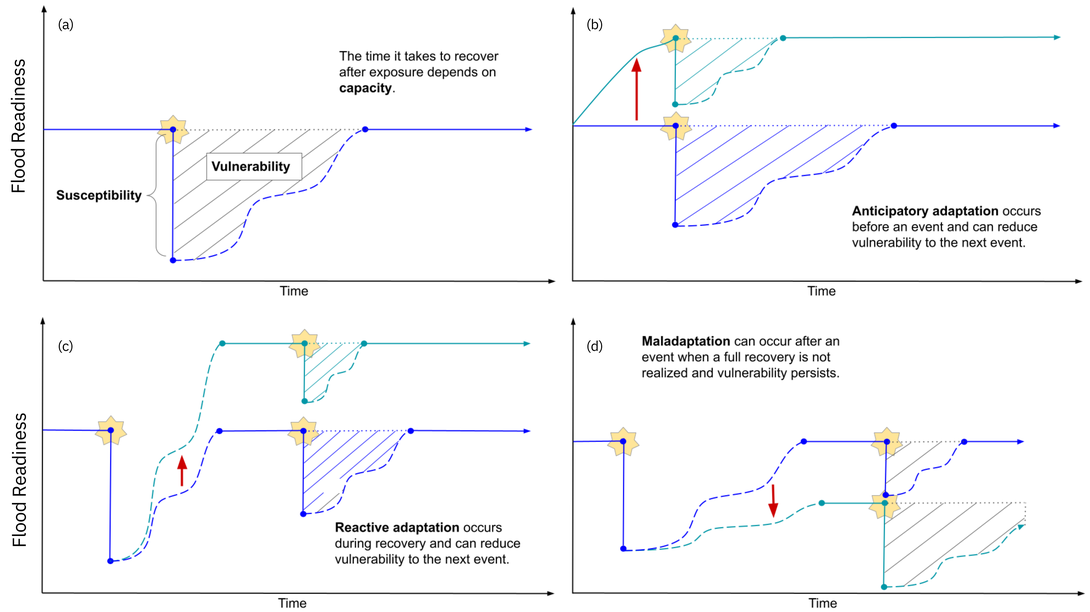

Figure 2 – Framework for flood resilience that focuses on the roles of susceptibility and capacity over time in flood response and recovery. (a) Depicts recovery back to pre-event state, (b) Anticipatory adaptation occurs in anticipation of an event and reduced vulnerability to the next event, (c) Reactive adaptation occurs during recovery and reduces future vulnerability, and (d) Maladaptation reduces flood readiness and can increase vulnerability to the next event.

NEXT STEPS:

- Continue developing the survey questions and complete the IRB training and approval process.
- Conduct flood modeling of Athens-Clarke County rivers and streams using the HEC-RAS models provided by the county.

REFERENCES:

1. Wing, O. E. J., Bates, P. D., Smith, A. M., Sampson, C. C., Johnson, K. A., Fargione, J., & Morefield, P. (2018). Estimates of present and future flood risk in the conterminous United States. *Environmental Research Letters, 13*
2. Tate, E., Rahman, M. A., Emrich, C. T., & Sampson, C. C. (2021). Flood exposure and social vulnerability in the United States. *Natural Hazards (Dordrecht), 106*(1), 435-457. 10.1007/s11069-020-04470-2