



# Property Flood Resilience Framework for Household-Level Decision Making



Extreme Events, Social Equity, and Technology Lab

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## Introduction

- The significance of property flood resilience has been widely recognized as an effective approach to flood risk management. However, it is argued that few households living in flood-prone areas voluntarily invest in protective measures, even when such measures are cost-effective (Kunreuther et al., 2013).
- Homeowners are particularly vulnerable to flood risks, especially in areas lacking adequate mitigation infrastructure or insurance coverage. Without sufficient insurance, households may face severe financial burdens, emotional distress, and long-term housing instability following flood events.
- This suggests that cognitive and socio-cultural barriers must be addressed to encourage investment in both hard and soft adaptive measures.
- This ongoing study examines why households fail to implement household-level flood protection actions.

## Research Question

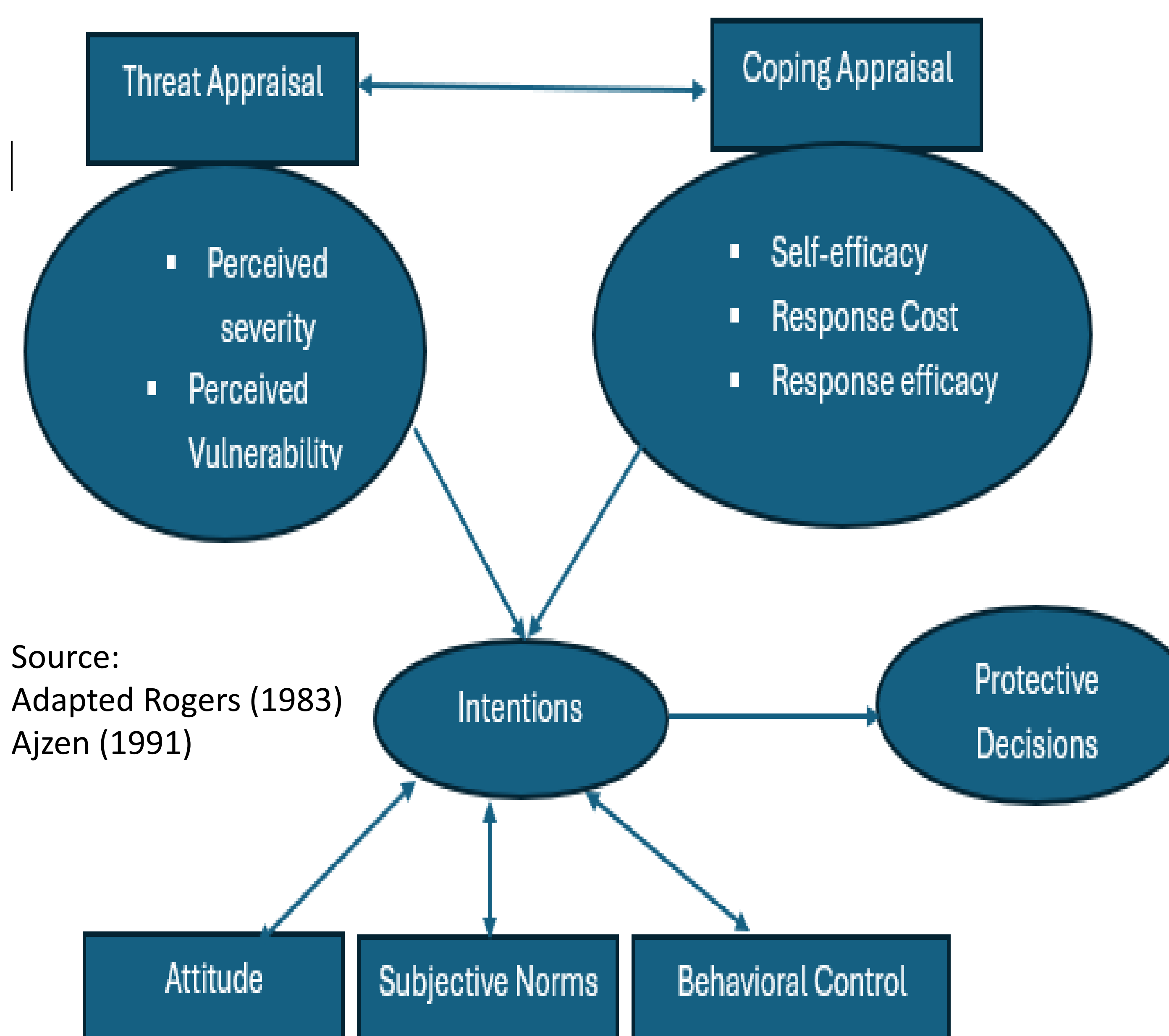
- What factors hinder households from adopting household-level flood adaptation measures?
- What is the level of household knowledge regarding hard and soft flood adaptation measures?
- What factors influence households' intentions to undertake adaptation actions in terms of attitudes, subjective norms, and perceived behavioral control?

## Flood-Affected Property



Source: Anderson Restoration LLC

## Conceptualized Theories



## Methodology

- This study integrates Protection Motivation Theory (PMT) and Theory of Planned Behavior (TPB) to predict household adoption of flood resilience measures. Ensemble learning models (Random Forest and Gradient Boosting) and SHAP analysis will identify and interpret the relative influence of cognitive and behavioral factors on decision-making outcomes.

## Expected Findings

- High risk perception alone does not translate into action due to perceived costs and barriers.
- Self-efficacy and perceived behavioral control will be the strongest predictors of protective decisions.
- The findings indicate that the most common reasons for unwillingness to adopt flood risk reduction measures were limited knowledge of their effectiveness and a lack of confidence in their ability to reduce risk.

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## Lists of Reference

