



Center of Excellence in Capacity-building
for Resilient Housing (CECREH)



2026 CECREH SUMMIT

Transforming Housing Recovery through
Research-driven Capacity Building

RESEARCH PORTFOLIO



2025 CECREH Summit

OCTOBER 22, 2026

TEXAS TECH UNIVERSITY · LUBBOCK
RED RAIDER LOUNGE · STUDENT UNION BUILDING

SUMMIT AGENDA

THURSDAY · OCTOBER 22 · RED RAIDER LOUNGE

Student Union Building · Texas Tech University · All times local

8:00–8:30 AM	Breakfast with student poster presentations
8:30–8:45	Welcome remarks Dr. Ali Nejat, CECREH Director Mr. Clay Cash, Member of TTU Board of Regents Dr. James Reecy, TTU Vice President for Research and Innovation Dr. Rod Williams, TTU Vice Provost for Outreach and Engagement
8:45–9:30	CECREH Impact and Innovation Dr. Ali Nejat, CECREH Director
9:30–10:15	Roundtable: Research Fellow Experiences Moderator: Dr. Ashley Ross, Associate Director Jesse Andrews · Kaifa Lu · Amin Sobhani Temidayo Popoola · Paul Iyoha · Mehrdad Nourbakhsh (TTU) Miranda Saucedo · Summer Pylant (TAMUG) Aaron Ford · Lamin Kabia (TSU)
10:15–10:45	Coffee break with student poster presentations
10:45–11:30	Post-Hurricane Harvey Construction Quality Study Moderator: Julia Orduña, Texas Housers Dr. Shannon van Zandt · Dr. Ivis Garcia (TAMU) Cecelia Fontenot (FHNR)
11:30–12:00	Break for group photo and box lunches
12:00–12:45 PM	Roundtable: Housing Recovery and the Road Ahead Moderator: Dr. Ali Nejat Maddie Sloan (Texas Appleseed) · Dr. Andrew Rumbach (Urban Institute) · Julia Orduña (Texas Housers) · Adam Pirtle (Legal Aid of NorthWest Texas)
12:45–1:00 PM	Closing remarks Dr. Ali Nejat, CECREH Director

RESEARCH FOR RESILIENT RECOVERY

CECREH connects climate science, housing research, engineering, planning and public policy to support resilient and equitable disaster recovery.



WHO WE ARE

Led by Texas Tech University, CECREH brings together researchers from six universities. The center develops evidence and practical tools for public agencies, practitioners and the communities they serve.

OUR MISSION

We study how climate risk, housing vulnerability and government capacity shape recovery. Our work helps communities and public agencies assess unmet needs and develop housing strategies that address unequal exposure, access and outcomes.

RESEARCH IN PRACTICE

Nine projects examine climate risk, recovery needs, government capacity and affordable housing. Studies of federal Community Development Block Grant–Disaster Recovery (CDBG-DR) funding sit alongside collaborations on post-Harvey construction quality and resilient 3D-printed walls.

9 research projects

5 journal articles

21 research posters

LEADERSHIP & FACULTY

An interdisciplinary leadership group spanning housing, disaster recovery, climate risk, planning, engineering and public policy.



Dr. Ali Nejat

Director

Texas Tech
University



Dr. Ashley D. Ross

**Associate
Director**

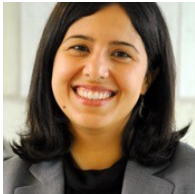
Texas A&M
University at
Galveston

CO-PRINCIPAL INVESTIGATORS



Dr. Rodrigo Costa

University of
Waterloo



Dr. Sara Hamideh

Stony Brook
University



Dr. Katharine Hayhoe

Texas Tech
University



Dr. Elaina Sutley

University of
Kansas



Dr. Laura Solitare

Texas Southern
University



Dr. Bradley Ewing

Texas Tech
University

RESEARCH FELLOWS AND ASSOCIATES

RESEARCH TEAM

Postdoctoral researchers, research fellows and graduate researchers translate the center’s portfolio into models, fieldwork, evidence syntheses and decision tools.



Jesse Andrews

Postdoctoral Research Associate



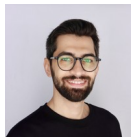
Kaifa Lu

Postdoctoral Research Associate



Abigail Ulman

Senior Research Fellow



Amin Sobhani

Research Assistant



Danielle Craig

Research Assistant



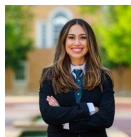
Paul Iyoha

Research Assistant



Mehrdad Nourbakhsh

Research Assistant



Miranda Saucedo

Research Assistant



Summer Pylant

Research Fellow



Temidayo Popoola

Research Assistant

NINE PROJECTS. THREE CONNECTED OBJECTIVES.

Nine projects connect climate risk, recovery needs and government capacity with policy and housing design. The research combines models, interviews, evidence reviews, program data and physical testing.

01 UNDERSTAND CLIMATE RISK 1A07 Historic climate risk 1B08 Future climate risk 1C09 Underserved needs	02 MEASURE RECOVERY CAPACITY 2A10 Recovery benchmarks 2B11 Local gov’t capacity 2C12 Housing recovery levers	03 TOOLS + INTERVENTIONS 3A13 Capacity + recovery 3B14 Future risk in action plans 3C15 Resilient housing
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READ THE PORTFOLIO AS A CONNECTED SYSTEM risk → needs → capacity → action

MODEL HISTORIC CLIMATE RISK

Flood losses reflect hazard, exposure and vulnerability. The project develops locally tested models of insured losses to support screening after major storms.

WITHIN-EVENT CLASSIFICATION PERFORMANCE

	Tax Day Flood	Harvey	Irma
Logistic	0.82	0.88	0.82
Random Forest	0.83	0.89	0.81
XGBoost	0.84	0.90	0.83

Classification discrimination (area under the curve, AUC). Higher is better.

RESEARCH APPROACH

Federal rainfall records and Harris County event comparisons established hazard patterns. National Flood Insurance Program loss data cover the Tax Day Flood, Harvey and Irma in Texas and Florida. Spatial and cross-event tests compare ordinary least-squares, spatial-lag, Random Forest, logistic regression and XGBoost models.

FINDINGS + APPLICATIONS

The 2026 Urban Climate article reports XGBoost AUC values of 0.84, 0.90 and 0.83 for the three events. Classification outperformed loss-magnitude regression. Transfer was stronger between Texas events than to Florida. The models screen observed insured losses and do not estimate total physical damage.

TEAM

Dr. Ali Nejat · Dr. Katharine Hayhoe · Temidayo Popoola
Jesse Andrews · Kaifa Lu



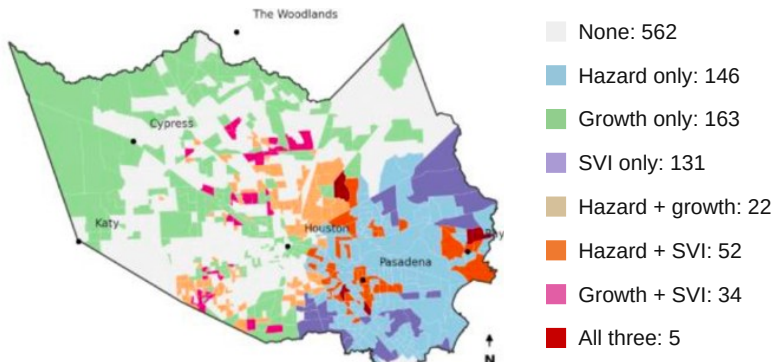
SCAN TO READ

PEER-REVIEWED ARTICLE
Urban Climate · 2026

MODEL FUTURE CLIMATE RISK

Projected rainfall, housing growth and social vulnerability can overlap unevenly. This project identifies persistent exposure hotspots and emerging development pressures in Harris County.

HARRIS COUNTY · PLANNING TYPOLOGY



Climate risk, household growth and Social Vulnerability Index (SVI).

RESEARCH APPROACH

Downscaled climate projections and housing-stock analysis inform a public dashboard linking precipitation at four warming levels with 2020–2050 population, households, employment, land use and vulnerability. The team tests 432 index specifications and examines historical losses, flood zones, mitigation, buyouts and planning priorities.

FINDINGS + APPLICATIONS

Among 1,115 tracts, 94 remain top-quintile priorities in at least 90% of specifications. Fifty-two combine high hazard and vulnerability. The 163 growth-only tracts account for 67.8% of projected household growth. Preliminary planning-gap analysis identifies 167 priority tracts, informing corrective and preventive adaptation.

TEAM

Dr. Ali Nejat · Dr. Katharine Hayhoe · Temidayo Popoola
Jesse Andrews · Kaifa Lu

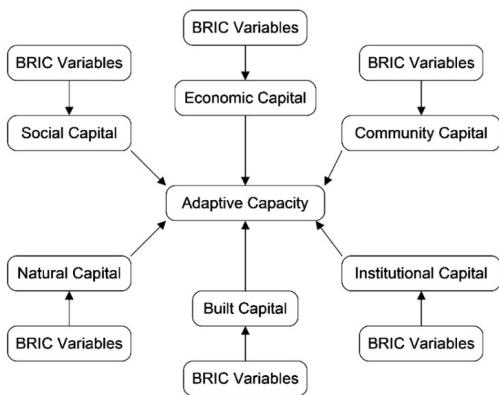


SCAN TO READ

[INTERACTIVE DASHBOARD](#)
[Harris County · 2020–2050](#)

IDENTIFY UNDERSERVED FUTURE NEEDS

Underserved communities face repeated flooding alongside limited infrastructure and institutional resources. This project examines how local capacities shape future housing needs in the Lower Rio Grande Valley.



MODEL INPUTS

Social
Economic
Community
Natural
Institutional
Built

Exploratory model of community capitals and adaptive capacity.

RESEARCH APPROACH

A published review covers tribal lands, colonias and unincorporated communities. Interviews with 14 officials and community leaders assess six capitals. Mapping uses Baseline Resilience Indicators for Communities (BRIC). An exploratory system dynamics model tests ten-year capital interactions in Cameron County. A resident housing-access survey is planned.

FINDINGS + APPLICATIONS

Interviews identify drainage constraints, slow assistance, staffing shortages, language barriers and coordination gaps. In exploratory simulations, institutional capital is most sensitive, and increased mitigation spending produces the largest modeled improvement. Findings inform engagement and infrastructure priorities. The model supports scenario discussion rather than forecasts.

TEAM Dr. Ashley Ross · Dr. Ali Nejati · Danielle Craig



SCAN TO READ

RELATED PUBLICATION

Disaster risk and community resilience

IDENTIFY BENCHMARKS OF RECOVERY NEEDS

Recovery measures need explicit reference points to guide decisions. The project examines how benchmarks can show whether housing recovery is adequate and equitable.

FROM INDICATORS TO DECISIONS

61

MANUSCRIPT
STUDIES

112

SUPPLEMENTAL
STUDIES

65

INCLUSIVE
MAPPINGS

19

STRICT
INDICATORSMEASURE / REFERENCE POINT / DECISION
CONTEXT

0

strict benchmarks in
manuscript sample

RESEARCH APPROACH

The team developed a benchmark taxonomy and evidence database, refined interview protocols with experts, and examined Hurricane Ian recovery records in Lee County. The review now distinguishes a 61-study manuscript sample from 112 eligible supplemental studies. Household interviews are planned to ground the proposed benchmarks in lived recovery experience.

FINDINGS + APPLICATIONS

Supplemental analysis found 65 inclusive benchmark mappings across 34 studies and 19 strict indicators across 12 studies; the manuscript sample contained no strict benchmarks. The manuscript is under final internal review. Indicators should be paired with transparent targets, standards or decision rules before agencies use them to judge recovery or allocate assistance.

TEAM Jesse Andrews · Dr. Sara Hamideh · Dr. Ashley Ross · Dr. Ali Nejat**SCAN TO READ**[PROJECT POSTER](#)

Natural Hazards Workshop · 2026

DEFINE LOCAL CAPACITY FOR EQUITABLE RECOVERY

Government recovery capacity depends on more than staffing and money. The project defines the capabilities needed to reach households and deliver equitable recovery over time.

LOCAL GOVERNMENT RECOVERY CAPACITY



ADMINISTRATIVE



TECHNICAL



FINANCIAL



INTERGOVERNMENTAL



COMMUNITY ENGAGEMENT

LITERATURE + PRACTITIONER INTERVIEWS

5

dimensions of local
recovery capacity

RESEARCH APPROACH

A cross-university synthesis covers five decades of scholarship and roughly 20 practitioner interviews on the 2018 Camp Fire and Lower Rio Grande Valley floods. Continuing Houston and Harris County interviews add CDBG-DR experience. The framework spans administrative, technical, financial, intergovernmental and community-engagement capacity.

FINDINGS + APPLICATIONS

Practitioners emphasize engagement and collaboration more than scholarship does. Staffing and funding are necessary, alongside structures that incorporate residents' experience into program design. The framework informs capacity-building guidance, participatory training and coordination. Coding continues; findings were presented at the 2025 Summit and 2026 Natural Hazards Workshop.

TEAM

Dr. Ashley Ross · Dr. Laura Solitare · Abigail Ulman
Miranda Saucedo · Summer Pylant · Dr. Ali Nejat



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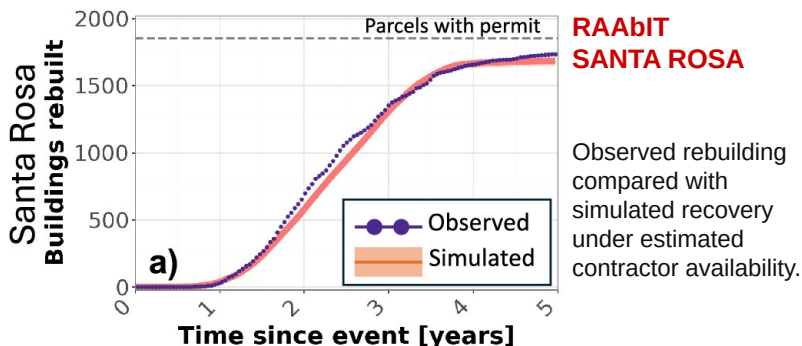
PROJECT POSTER

Natural Hazards Workshop · 2026

IDENTIFY LEVERS OF HOUSING RECOVERY

System dynamics and agent-based models examine how funding, administrative review and construction capacity shape recovery. Comparative grant analysis and a research review complement the simulations.

Empirically estimated



RAAbIT: observed and simulated rebuilding in Santa Rosa. Costa et al. (2026).

RESEARCH APPROACH

The system dynamics model follows 22,476 post-Harvey homeowner cases through review, funding and rebuilding. Recovery Assessment using Agent-based Tools (RAAbIT) models households, insurers and contractors. Rebuilding records test it in Santa Rosa and Paradise. Related studies compare grants across three states and review 35 computational recovery studies.

FINDINGS + APPLICATIONS

The preliminary system dynamics model distinguishes funding limits on completed homes from timing effects on recovery pace. Calibration against observed program records is the next step. RAAbIT reproduces observed wildfire rebuilding patterns. Grant analysis documents implementation delays in California, Florida and Texas. The models support comparison of recovery policies.

TEAM Dr. Rodrigo Costa · Dr. Ali Nejat · Dr. Sara Hamideh · Amin Sobhani



Recovery
grants
Article



RAAbIT
Journal
article



System
dynamics
Poster

MODEL HOW CAPACITY AFFECTS EQUITABLE RECOVERY

Administrative resources need to match recovery workload. This project examines how program-specific government capacity relates to CDBG-DR spending, completion and equitable delivery.

ADMINISTRATIVE-SUPPORT PRIORITY JURISDICTIONS



Red: priority jurisdictions in the May 2026 administrative-support screening.

RESEARCH APPROACH

Earlier grantee case studies and Texas recovery analyses inform a national study of 130,605 quarterly-performance records across 18 disaster cohorts through June 2025. A public database covers 2001–2023 disasters and appropriations across 40 states and territories, linking funding, geography and program narratives.

FINDINGS + APPLICATIONS

Heavier workloads are consistently associated with weaker recovery performance. Resource associations depend on data quality and how population is accounted for. Timing analyses retain programs that are not yet complete. Spatial screening identifies gaps in capacity and implementation, helping agencies target technical assistance.

TEAM

Dr. Sara Hamideh · Dr. Laura Solitare · Dr. Ali Nejat
Kaifa Lu · Jesse Andrews

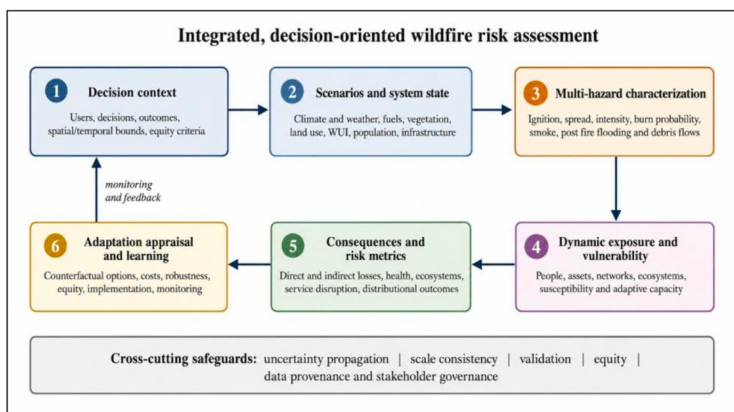


SCAN TO READ

[INTERACTIVE CDBG-DR DASHBOARD](#)
[National funding and program comparisons](#)

IMPROVE ACTION PLANS WITH FORWARD-LOOKING RISK

Recovery Action Plans must translate incomplete evidence into decisions. The project examines how climate information and simulation can strengthen planning for underserved communities.



Framework for wildfire risk assessment, adaptation and monitoring.

RESEARCH APPROACH

State Action Plan and expenditure comparisons track allocation changes during implementation. Houston interviews examine data, analytical and coordination needs after Harvey. A drafted wildfire-risk review integrates climate, land use, exposure, vulnerability, infrastructure, health and loss. Planned focus groups will refine practical uses of simulation.

FINDINGS + APPLICATIONS

Preliminary interviews reveal recurring data and coordination gaps. The integrated framework connects planning decisions to hazards, exposure, adaptation and monitoring, with attention to equity and uncertainty. It can inform Action Plan choices. The framework remains a research synthesis, with operational policy testing still ahead.

TEAM Dr. Rodrigo Costa · Dr. Ashley Ross · Dr. Ali Nejat · Kaifa Lu



SCAN TO READ

[RELATED PEER-REVIEWED ARTICLE](#)
[CDBG-DR Action Plans and implementation](#)

ASSESS RESILIENCE-COST TRADEOFFS

Manufactured housing must balance affordability and resilience. The project evaluates prices, installation systems and new construction methods to identify practical choices for hazard-resistant homes.



FULL-SCALE WIND TESTING

Installation and anchorage at the test site

7

test configurations
at full scale

RESEARCH APPROACH

The research combines price and retrofit-cost data with benefit-cost and life-cycle analysis, Florida wind fragility by installation era, and numerical anchorage models. Full-scale Wall of Wind tests examined three homes and seven configurations. RAMP, the concrete-printing collaboration with Hi-DARS Lab, adds parametric design, printed walls, debris-impact testing and finite-element analysis.

FINDINGS + APPLICATIONS

The pricing manuscript is in revision; other analyses remain drafts. Simulated mean benefit-cost ratio is 10.72 under baseline assumptions for 252 Texas counties; maintenance and operating savings dominate. Installation and anchorage remain critical to wind performance. A published 3D-printing review identifies opportunities and barriers; wall-response analysis supports further validation of resilient housing alternatives.

TEAM

Dr. Elaina Sutley · Dr. Bradley Ewing · Dr. Ali Nejat
Paul Iyoha · Mehrdad Nourbakhsh



SCAN TO READ

RELATED PUBLICATION

3D printing for resilient housing · 2026

FIND THE EVIDENCE

Published research, public tools and conference posters connect the center's findings with research and practice.



CECREH RESEARCHERS · NATURAL HAZARDS WORKSHOP 2026

DOCUMENTATION HUB

Five journal articles cover community resilience, recovery grants, flood losses, RAAbIT and 3D printing. Two dashboards and 21 posters extend the portfolio, including Amin Sobhani's system dynamics model of post-Harvey housing recovery.

5

PUBLISHED
ARTICLES

2

INTERACTIVE
DASHBOARDS

21

RESEARCH
POSTERS



DOCUMENTATION
HUB

PROFESSIONAL DEVELOPMENT

Research mentorship, field partnerships and national exchange give emerging scholars opportunities to connect technical research with public policy and community needs.



Amin Sobhani · Advanced Study Program Summer Colloquium
National Center for Atmospheric Research · July 2026

- 2024

Training

Climate, data analysis and planning training, plus research exchange at the Natural Hazards Workshop.
- 2025

Practice

Texas Housers internship, presentations at the Natural Hazards Workshop and the National Association of Black Geoscientists conference, and the inaugural Summit.
- 2026

Policy

National Low Income Housing Coalition internship, National Center for Atmospheric Research training, Association of State Floodplain Managers practicum, National Voluntary Organizations Active in Disaster conference and Bill Anderson Fund workshop.
- 2026

Exchange

Research travel to Florida International University and the University of Kansas. Presentations at the Natural Hazards Workshop, 13th U.S. National Conference on Earthquake Engineering, International System Dynamics Conference and Texas Civil Engineering Conference.

COMMUNITY PRACTICE AND RESEARCH EXCHANGE



TEXAS HOUSERS INTERNSHIP · SUMMER 2025

Amin Sobhani connected housing-recovery research with community advocacy, construction quality and equitable CDBG-DR investment.



NATURAL HAZARDS WORKSHOP · JULY 2025

Faculty leadership and student research in Broomfield, Colorado.

LEARNING IN THE FIELD



RESEARCH TRAVEL • MAY 2026

Paul Iyoha at the Wall of Wind

Full-scale testing at Florida International University covered manufactured-home anchorage, instrumentation, installation practices and structural response.



CONFERENCE • MAY 2026

Temidayo Popoola at the recovery conference

The National Voluntary Organizations Active in Disaster conference in Reno, Nevada, focused on inclusive recovery, data tools and coordination across sectors.

APPLIED LEARNING

INTERNSHIPS

Amin Sobhani's internships with Texas Housers (2025) and the National Low Income Housing Coalition (2026) connected housing advocacy with recovery policy.

POLICY ENGAGEMENT

Temidayo Popoola's floodplain-management policy practicum, congressional visit and Bill Anderson Fund workshop connected flood-loss research with policy and interdisciplinary practice.



MORE STORIES + CURRENT ACTIVITIES
depts.ttu.edu/cecreh/professional-development



Center of Excellence in
Capacity-building for RESilient
Housing

BUILDING THE EVIDENCE FOR MORE EQUITABLE HOUSING RECOVERY.



EXPLORE THE RESEARCH
PROJECTS, PUBLICATIONS,
POSTERS AND DASHBOARDS

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