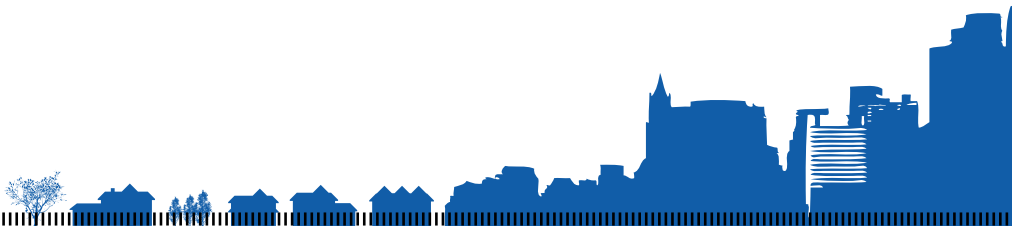# Advancing HUD's Learning Agenda through Cooperative Agreements with Historically Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, and Alaska Native/ Native Hawaiian-Serving Institutions

Short White Paper on Disaster Recovery

Advancing HUD's Learning Agenda through Cooperative Agreements with Historically Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, and Alaska Native/ Native Hawaiian-Serving Institutions: Short White Paper on Disaster Recovery

Introduction

The Office of Policy Development & Research (PD&R) within the U.S. Department of Housing and Urban Development (HUD) recently published a Notice of Funding Opportunity (NOFO) titled *Advancing HUD's Learning Agenda through Cooperative Agreements with Historically Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, and Alaska Native/ Native Hawaiian-Serving Institutions.* Through this funding opportunity, PD&R seeks to fund quality research that contributes to knowledge on housing and community development and to support minority-serving institutions to conduct housing and community development research important to the communities and students the institutions serve. Applicants for funding must submit a research project proposal that addresses one of the specific research questions featured in the NOFO.[1] The research questions are broadly organized under seven topic areas: (1) Community Development and Place-Based Initiatives, (2) Disaster Recovery, (3) Fair Housing, (4) Homelessness, (5) Homeownership, Asset Building, and Economic Opportunity, (6) Housing and Health, and (7) American Indian, Alaska Native, and/or Native Hawaiian Housing Needs.

This short white paper is designed to provide a high-level overview of the current state of the research within the topic area of Disaster Recovery, references to foundational studies related to Disaster Recovery, and the general context for the research questions that are included in this NOFO. This paper is designed to provide potential applicants with a common grounding in the topic as they consider this new funding opportunity.

Background

Natural disasters are not a new phenomenon. However, many types of disasters are becoming more common and more severe, and their impacts are increasing as more development and economic investment are concentrated in areas exposed to natural hazards. The number of major disaster declarations has increased from an average of 39 per fiscal year in the first decade after the enactment of the Stafford Act (FY 1988-1997) to an average of 63 in the most recent decade (FY 2015-2024) (CRS, 2024). Disasters are also becoming more costly. Between 2019 and 2023, the United States experienced an annual average of 20.4 disasters with losses exceeding $1 billion (inflation-adjusted) per disaster (NOAA, 2024).

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[1] See a full list of the research questions in Section III.G under the subheading "Eligible Research Questions."

HUD plays a pivotal role in disaster recovery, largely through the administration of Community Development Block Grant Disaster Recovery (CDBG-DR) funds. Since 1993, Congress has made almost $100 billion in supplemental appropriations for CDBG-DR funds to help states and localities recover from disasters. As of October 2024, 80 grantees are currently administering 230 active HUD-funded grants for disaster relief, long-term recovery, restoration of infrastructure and housing, economic revitalization, and mitigation (HUD, 2024). HUD also leads the Housing Recovery Support Function (RSF), one of six RSFs that serve as the coordinating structure for disaster recovery assistance under the National Disaster Recovery Framework (FEMA, 2011).

Natural disasters may elicit different types of federal response, depending on the scale of destruction. Under the Stafford Act, there must be a presidential disaster declaration before federal financial and humanitarian assistance may be provided. Whether disaster declarations are made for certain types of natural hazards has implications for if and how federal resources are distributed to impacted communities. Whereas a minor event may yield no federal response, a major disaster may yield one of two types of presidential disaster declarations: emergency declarations and major disaster declarations. Emergency declarations typically signify widespread damage and disruption and often require federal recovery assistance, which statutorily may not exceed $5 million, though in practice this is a soft cap. On the other hand, major disaster declarations can indicate a level of devastation that overwhelms local and state resources, necessitating significant federal aid.

Disasters can be categorized into two types: slow-onset disasters and rapid- or sudden-onset disasters. A sudden-onset disaster is triggered by a hazardous event that emerges quickly or unexpectedly, whereas a slow-onset disaster emerges gradually over time. Despite their detrimental impacts, slow-onset events—such as drought, sea level rise, and permafrost thaw—often do not result in disaster declarations. Similarly, extreme heat events are the deadliest natural hazard but typically do not result in disaster declarations due to lesser impacts on the built environment compared to other natural hazards. There exists a gap in research on how communities are preparing for and responding to these under-supported types of hazards, including potential relocation needs. Similarly, there is limited research on the impacts of natural hazards—including slow-onset events and extreme heat—on migration, mobility, and relocation.

Disasters may be natural, but many of their impacts are socially constructed based on whom and what society decides to protect. HUD is interested in making disaster recovery more effective and equitable for communities across the country. Research that engages impacted communities directly is encouraged but must be conducted thoughtfully and ethically so as not to overburden communities as they recover.

Research Questions of Interest Related to Disaster Recovery

HUD is interested in research proposals that address one of the following policy-relevant research questions, which are adapted from HUD's Learning Agenda:

1. How have the most devastated communities affected by natural disasters recovered, and how have different public policies and local implementation affected that recovery?

2. Where do people go after a natural disaster, and what are the disaster survivors' characteristics and other distinguishing factors that lead survivors to permanently leave, stay, or return to their impacted communities?

3. How are communities responding to and addressing the relocation needs resulting from natural disasters, including slow-onset disasters (e.g., thawing permafrost, sea level rise, and drought)?

4. How have communities successfully prepared for and responded to extreme heat events, especially for high-risk populations, such as older adults, persons living with disabilities, agricultural workers, and families with young children?

Context for the Research Questions of Interest

Additional context for each of the four research questions of interest is discussed in greater detail below.

Question 1: How have the most devastated communities affected by natural disasters recovered, and how have different public policies and local implementation affected that recovery?

Disasters may exacerbate underlying social, economic, and environmental conditions. Even within the same community, disaster impacts and recovery needs may vary across social dimensions, such as age, socioeconomic class, gender, housing tenure, race and ethnicity, and gender. Place-based factors, such as population density, infrastructure vulnerability, and geographic location, also influence the extent of damage and the subsequent recovery process following a disaster.

Underlying social, economic, and environmental factors—such as poverty, inadequate housing, and limited access to essential services—can amplify the severity of damage and hinder recovery efforts, highlighting the need for holistic approaches to pre-disaster preparedness and post-disaster response. As an example, Hurricane Maria intensified existing challenges facing Puerto Rico's fragile health and social services systems and infrastructure, demonstrating the need to build their capacity pre-disaster, as well as an infrastructure conducive to healthy communities and economic opportunity more generally (Chandra et al., 2021). The effectiveness of disaster

preparedness and response measures depends on the degree to which community stakeholders are engaged as legitimate partners in the planning process (Andrade et al., 2023). While traditional disaster risk management approaches rely heavily on government resources, community-engaged approaches leverage existing social networks, resources, and strengths.

A considerable body of research demonstrates the outsized impacts of disasters on vulnerable populations. In many ways, social vulnerability mirrors the geography of inequality and poverty (Cutter and Finch, 2018). For example, Black communities were disproportionately likely to die and remain missing following Hurricane Katrina (Sharkey, 2007). Davies et al. (2018) finds that wildfire vulnerability varies by the racial and ethnic composition of census tracts across the United States, with majority Black, Hispanic or Native American census tracts experiencing an approximately 50% greater vulnerability to wildfire compared to other census tracts. Willison et al. (2019) finds that the federal government's response following Hurricane Maria was not commensurate to storm severity and recovery needs, compared to the responses in Texas for Hurricane Harvey and Florida for Hurricane Irma occurring the same year, despite the underlying vulnerability of Puerto Rico's population, approximately 40% of which lives below the poverty line. The uneven vulnerability to disaster impacts necessitates disaster planning and response approaches that are commensurate to need and that consider the adaptive capacity of at-risk groups.

The Federal Emergency Management Agency (FEMA) and the Small Business Administration (SBA) are the primary actors responsible for providing federal assistance in the immediate aftermath of a disaster. Through CDBG-DR, HUD provides long-term disaster recovery assistance to address needs unmet by private insurance and federal assistance during the earlier response phase. A key critique of HUD's CDBG-DR funds and focus of research has been the delay in spending recovery dollars. CDBG-DR grantees, including state and local government agencies, take considerable time to design their assistance programs. Previous research contracted by HUD finds that an average of four years elapses between disaster declaration and expending 90 percent of budgeted CDBG-DR housing recovery grant funding (Martín et al., 2019). However, average grant completion time has shortened in recent years (Martín et al., 2021). HUD has also funded other research on CDBG-DR, including on renter outcomes, buyout and acquisition program outcomes, equitable outcomes in flood resilience, and wildfire recovery.

Public policies and public administration play a crucial role in shaping the local implementation of disaster response and recovery efforts. Effective policies can mitigate the impact of disasters by addressing underlying vulnerabilities, allocating resources equitably, and promoting resilient infrastructure. Additionally, competent public administration ensures that these policies are implemented efficiently and effectively, reaching those most in need (McDonnell et al., 2017). Understanding the complex factors that contribute to community devastation and implementing well-designed policies and administrative practices can help build more resilient communities

and minimize the short and long-term consequences of natural disasters. HUD is interested in funding research that directly addresses this research question, including but not limited to research on any of the aforementioned topics.

Question 2. Where do people go after a natural disaster, and what are the disaster survivors' characteristics and other distinguishing factors that lead survivors to permanently leave, stay, or return to their impacted communities?

Natural hazards cause people to move both proactively and reactively. Underlying social, economic, and environmental vulnerabilities can influence the decision of individuals within those communities to remain, leave, or return. Decisions also vary as the severity of the disaster scales. Mobility decisions are made by individuals and families in the normal course of one's life outside the disaster context; in the context of disasters, mobility decisions can be characterized as either short-term moves made to respond to immediate needs or longer-term moves made following the first 90 days of a disaster.

Mobility decisions are influenced by the intersection between disasters' varying scope and complexity and the underlying conditions of both individuals and communities. Many individuals face financial and employment burdens as they try to recover, while communities struggle with continuity of public services, business services, transportation and road access, and infrastructure performance. A literature review of relocation and resettlement research identified six major attributes of relocation: agency, planning, grouping, distance, speed, and temporality (Yarina, 2023). These attributes can be used to evaluate and prioritize specific aspects of relocation.

The decision on whether and how to move is tied to social vulnerability. People who are more socially vulnerable are more likely to be displaced following a disaster (Singh, Eghdami, and Singh, 2014). They are also more likely to stay in a disaster location initially and deal with casualties and damage that then force them to leave (Thompson, Garfin, and Silver, 2017). A primary driver of staying and rebuilding is insurance (Kousky, 2019). Socially vulnerable populations are less likely to have insurance and other financial resources to rebuild. The feasibility of selling and the availability of buyout programs can also influence a household's decision to stay in a location or to move, and whether that move is temporary or permanent (Greer, Brokopp Binder, and Zavar, 2022).

Where people relocate is variable and depends on social factors, resource availability, and disaster characteristics. A person's social network influences where they go both in the short and long term. Familial geographic ties and locations of friends and community often determine where people relocate (Bañgate et al., 2017). A household's proximity to their jobs, childcare, and education will factor into the decision to return (Asad, 2015). Many people prefer to stay in

the same area. For instance, after receiving a buyout, people often stay in the same community (within six miles of the original location), sometimes relocating to a hazardous location (Elliott and Wang, 2023). Disaster-specific characteristics such as the type and severity of damage can also impact housing markets and availability of housing, affecting where people relocate. Both short and long-term housing markets can be affected, as limited housing supply increases housing prices. Gentrification, or investments in post-disaster rebuilding that increase the value of the land, can also impact a community's ability to resettle and make returning post-disaster more difficult (Van Holm, Joseph, and Wyczalkowski, 2019). Discrimination may also affect the ability of communities of color to return. For instance, in the context of post-Katrina New Orleans, both "macroeconomics and microaggressions […] restrict where and how Black resettlement takes place" (Aidoo, 2021).

Research finds that private rental housing, which HUD finances via subsidies to developers or tenants, takes longer to recover than owner-occupied housing (NLIHC and PAHRC, 2023). Recovery time affects the decision of renters. A 2014 study finds that subsidized renters are the least likely demographic to return to their pre-disaster residences (Fussell and Harris, 2014). Recovery is particularly slow for public housing. Many tenants do not return, and sometimes public housing is not rebuilt due to the complex political economy of public housing (Graham, 2012; Graham, 2020; Hamideh, 2018; Khajehei, 2019).

HUD is interested in knowing how the topics mentioned and other factors influence post-disaster moves, to what extent and how people are affected, and who is most affected. HUD is interested in understanding how these factors vary by disaster type, severity, and frequency. Research that contributes to understanding locational changes and patterns, as well as the motivating drivers for those changes, would contribute to the evidence base. Much of the available literature focuses on the mobility of homeowners post-disaster, but there is a gap in research regarding renter outcomes and individual decision-making timelines in this space. HUD is also interested in understanding relocation outcomes for HUD-assisted households.

Question 3. How are communities responding to and addressing the relocation needs resulting from natural disasters, including slow-onset disasters (e.g., thawing permafrost, sea level rise, and drought)?

Communities have addressed the disaster-driven relocation needs of residents largely through the concept of managed retreat (Hino, Field, and Mach, 2017). Managed retreat, sometimes referred to by other terms such as community-driven relocation, is a strategy for responding to environmental hazards such as rising sea levels, extreme flooding, and other forms of land degradation. It involves the planned, deliberate relocation of people, infrastructure, and activities away from areas that are increasingly vulnerable to these hazards (Ajibade et al., 2022; Dundon and Abkowitz, 2021). The goal is to reduce the long-term risks and costs by relocating

communities from exposed or at-risk areas. There is a long, yet sporadic history of managed retreat programs in the United States (Pinter, 2021).

In the United States, managed retreat programs include an array of policies designed and managed by local, state, and federal agencies. These policies include the transfer of development rights (TDR) from high-risk to low-risk areas (Machemer and Kaplowitz, 2002; Robb et al., 2020) and home buyout programs, where public funds are used to purchase private property from willing owners and preserve it from future development. Research shows considerable cost savings and economic benefits from the relocation of residents and infrastructure from high-risk areas. There is compelling evidence for the economic benefits of managed retreat programs, including loss avoidance studies from the Federal Emergency Management Agency (FEMA, 2024). These benefits have been primarily estimated through models (e.g., Pinter and Rees, 2021), and longer-term retrospective evaluations of managed retreat are needed.

While home buyout programs seem to be cost-effective in theory, their efficacy depends on a range of factors, with case studies finding significant barriers to effective implementation (Sherri, Greer, and Zavar, 2020). As buyout programs are typically voluntary, studies have found varying degrees of community adoption based on the social, cultural, and historical context of each community, suggesting the impact of home buyout programs depends on neighborhood characteristics. Other studies identified dozens of constraints on the adoption of managed retreat programs, including contextual barriers, governance issues, public opposition, and issues around planning, funding, and equity (Lawrence et al., 2020). A key question is how to buy out homes equitably: which residents should be targeted for buyouts, and how much should they be compensated for moving? HUD is currently conducting research on equitable outcomes in CDBG-DR-funded buyout programs. Another question concerns the outcomes of owners who refuse buyouts and choose to stay. Communities face fiscal consequences from moving taxpayers and can struggle to sustain services in areas targeted for buyouts (Miao et al., 2024).

One of the most famous examples of managed retreat is the case of Isle de Jean Charles, a Louisiana barrier island home to the Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw Indians facing existential threats from sea level rise (Louisiana Office of Community Development, 2021). One challenge of the resettlement program has been mistrust of the federal government based on historic colonialism, dispossession, and discrimination faced by American Indians (Simms et al., 2021). The case of Isle de Jean Charles shows how difficult managed retreat can be. Communities are not homogenous, they may be distrustful of the government, and relocation is inherently a traumatic process that can threaten residents' livelihoods, communal bonds, and socio-cultural meaning. Additionally, finding an appropriate site for a community to move to can be very challenging. Unlike in the case of Isle de Jean Charles, these are often existing communities, known as receiving communities (Georgetown Climate Center, nd). More

research needs to be done on receiving communities and their responses to climate-induced migration.

Managed retreat is also being pursued by Alaska Native villages facing thawing permafrost and sea level rise. An estimated 70 of over 200 Alaska Native villages face significant environmental threats from erosion, flooding, or thawing permafrost (GAO, 2022). An example of managed retreat is being pursued by residents of the Native village of Newtok, who voted to relocate to a new site called Mertarvik nine miles away (Georgetown Climate Center, nd). The Denali Commission has led the relocation efforts but has needed additional funding from other sources, including FEMA, the Bureau of Indian Affairs, HUD, and the state. The need for interagency support to fund this relocation makes both its administration and its evaluation more challenging.

Transfer of development rights (TDR) is another policy that supports managed retreat. TDR is a land-use strategy that allows property owners to sell the right to develop their land (known as development rights) to a buyer who wants to develop elsewhere. The idea is to shift development from high-risk areas to areas where development is encouraged. A study on the efficacy of TDR programs in Pennsylvania, Maryland, and New Jersey shows that program success depends on local land use demand, leadership, and funding mechanisms (Machemer and Kaplowitz, 2002).

In addition to direct interventions like home buyouts and TDRs, incentivizing relocation to less hazardous areas can also be accomplished through indirect interventions such as overlay zoning (Schwab and Topping, 2010; Srivastava and Laurian, 2006). Overlay zoning adds requirements or incentives to an existing zoning district. In the context of managed retreat, overlay zoning can support the gradual, planned relocation of communities and infrastructure away from areas vulnerable to hazards like sea level rise, flooding, or coastal erosion.

Research is needed to understand how communities address relocation needs associated with natural hazards and disasters, and how they might design effective and equitable strategies as these needs grow. There have been few examples of managed retreat for an entire community in the United States, and long-term evaluations of these processes and outcomes are missing. There has been limited research on managed retreat in response to certain slow-onset disasters, such as drought. Additionally, much of the research on relocation has been focused on buyouts. More research is needed on indirect incentives for relocating existing owners and future development to safe areas, including transfer of development rights and overlay zoning. Finally, managed retreat is a paradigm that can be contrasted with the strategy for communities to fortify and stay. Researchers can explore how communities decide which strategies to pursue and which lead to safer and more equitable outcomes for communities at risk of natural disasters.

Question 4: How have communities successfully prepared for and responded to extreme heat events, especially for high-risk populations such as older adults, persons living with disabilities, agricultural workers, and families with young children?

Extreme heat refers to a situation when "the temperature reaches extremely high levels or when the combination of heat and humidity causes the air to become oppressive" (Centers for Disease Control, n.d.). In the United States, extreme heat events are increasing in severity, frequency, and geographic reach (U.S. Environmental Protection Agency, n.d.). This means that temperatures are higher and that areas of the United States that were not as hot in the past, such as the Pacific Northwest, are projected to experience more heat waves in the future.

Extreme heat impacts larger ecosystems, the built environment, and public health. Heat is the leading cause of weather-related deaths worldwide (WHO, 2024). In the United States, the number of heat-related deaths increased sharply between 2016 and 2023 (Jeffrey et al., 2024). Heat-related illness and death are projected to increase (Ebi, Clements, & Bunn, 2021). Analyses show that children, people aged 65 or older, non-Hispanic Blacks, people with cardiovascular and respiratory illnesses, and those who are economically disadvantaged are more likely to die from heat exposure than others (Berko et al. 2014). Heat-related mortality is also greater among men (Vaidyanathan, Malilay, Schramm, & Saha, 2020).

Cities make extreme heat worse due to the urban heat island (UHI) effect. Recognized as early as 1818 (Mills, 2009) and explained in Lowry's "The Climate of Cities" (1967), the UHI refers to the fact that cities are warmer than surrounding rural areas because people in cities produce heat by heating homes, driving cars, and other activities. At the same time, the concentration of buildings and infrastructure in urban areas traps heat, particularly in areas with dense high-rise buildings. Materials commonly used to build roads and buildings absorb heat during the day and emit heat during the night, contributing to elevated nighttime temperatures. Urban areas can experience afternoon temperatures 15°F to 20°F warmer than surrounding vegetated areas (National Integrated Heat-Health Information System, nd).

A large body of literature finds that social disadvantage may increase exposure to extreme heat and vulnerability. For example, Hoffman et al. (2020) studied 108 urban areas in the United States and found that historically redlined neighborhoods are hotter than non-redlined neighborhoods. Reid et al. (2009) map factors that increase vulnerability to heat such as income level and access to air conditioning and find that inner cities show the highest vulnerability. Gabbe and Pierce (2020) find that public housing is disproportionately located in the hottest census tracts in California. Eric Klinenberg's (2015) study of Chicago's 1995 heat wave identified social isolation as a key risk factor for heat-induced death.

Fortunately, there are many ways to mitigate and manage heat. Urban planners can assess the impacts of urban development projects on heat. Data that supports planning to manage and mitigate heat are available from NASA, NOAA and other entities (Dehaene et al., forthcoming; Ross et al., forthcoming; Hulley et al., 2019; Shandas et al., 2019). For example, the DEVELOP program in NASA worked with the city of Austin, Texas, and identified 121 census block groups (out of 605) most at risk of adverse effects of extreme heat events (McCall et al., 2021). In another example, NASA's ECOSTRESS program identified locations where exposure to heat intersected with socially determined heat vulnerability (age, disability, employment status, poverty) in the Los Angeles area during a heat wave in 2018. This study found that East Los Angeles was the most vulnerable area: the built environment enhances the UHI effect, and the population is low-income. Further, the study found that cooling centers were not optimally located to serve the most vulnerable (Hulley et al., 2019).

Combining temperature measurements with community experiences is useful for pinpointing problem areas. For instance, a recent study of extreme heat in Richmond, Virginia, combined satellite measurements with ambient air temperatures and data on heat-related emergency medical services. The study showed insufficient publicly accessible buildings with air conditioning and that men were more likely to have heat emergencies than women (Braun et al., 2024).

Architects and planners can design neighborhoods to promote thermal comfort by providing areas of shade-giving trees, harnessing wind for cooling, positioning buildings for cross-ventilation, and using embellishments like street arcades (covered street areas) and porches (Keith and Meerow, 2022; Lombard, Plater-Zyberk, forthcoming; Trego, forthcoming). Other interventions in the built environment include community cooling centers, painting streets and roofs with reflective materials (Keith and Meerow, 2022), planting urban forests that provide shade (Ettinger et al., 2024), and using water features to cool the environment through evapotranspiration (Zheng et al., 2020).

Heat governance is needed to mitigate and manage heat. Some cities and states have created new governance structures around extreme heat, such as Chief Heat Officers (e.g., in Miami-Dade County) and heat response and mitigation offices (e.g., in Phoenix, Arizona). A big part of successful management is the resilience of the energy grid during heat waves. In light of this, some communities are working with utilities to ensure that power grids are resilient to increased load demands caused by cooling needs (Schellenberg and Schwartz, 2024).

At the household level, access to cooling is essential. Government programs, such as the Low-Income Home Energy Assistance Program (LIHEAP), provide subsidies to low-income households for air conditioning. Some public housing agencies are retrofitting their public housing with energy-efficient cooling systems such as heat pumps. Pilot projects are being

conducted by the New York City Housing Authority, which is installing window heat pump units via a $263 million industry competition (the Clean Heat for All Challenge) (Calma, 2023), and the Boston Housing Authority, which is installing a networked geothermal heat pump that will heat and cool seven different public housing buildings in a neighborhood (City of Boston, 2024).

In summary, existing research demonstrates that exposure to dangerous levels of heat is increasing and that socially vulnerable populations suffer the most from heat exposure. Less well studied is how communities develop and implement interventions that address these risks through cooling the environment and better protecting vulnerable residents. HUD is interested in funding research on how communities prepare effectively for the increased intensity and frequency of extreme heat events, and how communities successfully protect high-risk populations, such as older adults, people with disabilities, outdoor workers, public housing residents, low-income households, and families with young children. Proposals could focus on a particular community, on urban design, on innovations in building technologies, or other topics, but must clearly contribute to answering the research question related to how communities prepare for and respond to extreme heat.

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