Resilience Hubs: A Climate Change Resource for Vulnerable Populations in the United States

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Abstract: The threat of climate change disproportionately impacts racial and ethnic minority communities in the United States. Communities experiencing environmental racism are more sensitive to the effects of social stressors, such as lack of access to adequate and appropriate healthcare, education, and economic stability. As a result, these communities often have fewer social resources with which to both protect themselves and recover from as well as adapt to extreme weather events, such as flooding, wildfires, hurricanes, poor air quality, and temperature extremes. Climate change exacerbates the historic, systemic oppression of vulnerable communities and worsens existing disparities resulting from cumulative environmental hazard exposure. Traditional approaches have historically failed to prioritize the needs of marginalized communities. Community-driven resilience has the capacity to drive transformative resilience through the disruption of traditional power structures by centering resilience around the site-specific needs of communities. Community resilience can be increased through Resilience Hubs, physical structures where residents can gather for shelter, support, resources, and community connections. Resilience Hubs strengthen community solidarity and offer aid to community members suffering from the effects of climate change and climate disasters. This chapter discusses community-based Resilience Hubs as a method of addressing the disproportionate impact of climate change on vulnerable racial and ethnic minorities.

1. Vignette

Resilience Hubs are community-sponsored spaces that serve to strengthen social cohesion and offer aid to community members facing the effects of chronic climate change and acute climate disasters. Hubs can serve communities during a disaster by providing shelter, power, food, and medical supplies. Hubs can also be sources of disaster-preparedness education and information on resources necessary to prepare for as well as recover from disasters. Where emergency shelters address temporary needs during a disaster, Resilience Hubs are intended to be spaces for before, during, and after a climate emergency. Hubs are one way of addressing the disproportionate impact of climate change on vulnerable racial and ethnic marginalized neighborhoods by helping such communities adapt to chronic climate change and acute climate disasters. As a transformational resilience tool, hubs not only link to other essential needs but also enhance the economic and social capital of immediate communities. In Petersburg, Virginia, the Virginia Environmental Justice Collaborative (VEJC)

worked with the community to create a Resiliency Hub in the city. The Resiliency Hub, through centering their resilience work on the needs of the community, utilizes the knowledge of the community for transformation and innovation. The following vignette, as told by Queen Shabazz, a hub founder, tells their story.

I became involved in environmental justice work 26 years ago when my son was poisoned by lead. This prompted me to found United Parents Against Lead and eventually become the CEO for the Virginia Environmental Justice Collaborative. The collaborative advocates for clean air, water, and soil. We were participants in the halting of the Atlantic Coast Pipeline and we are now working to do the same with the Mountain Valley Pipeline. Central to our efforts is the objective to support and protect the environmental justice communities that we serve and work with. The cumulative impacts of climate change are steadily hitting frontline and fence line communities and we want to lend support to those voices in those communities that are fighting to protect their safety and health.

One of our major initiatives is the Resiliency Hub in Petersburg, Virginia. This was a joint effort of United Parents Against Lead and the 45 member organizations of the Virginia Environmental Justice Collaborative. The Petersburg Resiliency Hub is the first of its kind in the state. Built in 1941, the building has historic significance as a United Service Organization (USO) facility for Colored Army troops during military segregation in World War II. Because of the building's age, it was in poor condition structurally and was about to be demolished. We are happy that we were able to preserve it and save that history and use it for something similar to its original intended purpose.

Petersburg had been very distressed once the economy collapsed and many of the major businesses employing people pulled out. There are several blocks that are abandoned, just vacant lots or abandoned buildings that have been there for years. The community where the hub is located was once known as the "Delectable Heights" and was a community of working class, Black professionals. Once we started work on the hub, other people started buying up some of those vacant properties. We like the fact that we are instrumental in revitalizing the community back to where it once was. Strengthening the workforce, so that community residents will be able to provide for their families is also a key component to this revitalization that the hub will address.

To start the process of turning this historic building into a functional Resilience Hub for the community, we received a planning grant through the Partnering for Resilient Communities from the Institute for the Sustainable Communities. After we finished the planning grant, we got implementation funds to start restoring the structure of the building and

getting solar panels. The solar panels were donated by the Honnold Foundation. The Clean Energy Group also funded us to have a feasibility study conducted. The hub was a perfect fit for those who were looking to fund projects that promote clean energy and support historically economically disadvantaged communities. Other funders just started approaching us, wanting to support the Resiliency Hub.

When extreme weather events occur, the Resiliency Hub serves the immediate community as a place to shelter, a place to stay warm when the weather is cold, or as a cooling center in the summertime during extreme heat. It is also a place for food and fellowship. This is a place for community members to power up their electronic and medical devices, store their medication and baby food. The Hub will be of service, not only during a climate crisis, but every day, for educational workshops, training, and certifications. We offer 1st Aid CPR AED certifications, lead and mold inspection and remediation, Healthy Homes certification, and Solar PV Installation certification. Children can come and do their homework after school. For some community members, the Hub serves as a food pantry for people to come and get food. We are even talking about getting electric vehicle charging stations across the street in the parking lot.

Our idea is to be a central point where people can come for information, not just in times of distress, but to be there every day to disseminate information and resources and a meeting place for community members to host various activities. It is a place where people can come and voice their concerns. We bring in the mayor and other elected officials and people in the city administration that they need to speak to. It would be a central space, for all the concerns of the city to know that they have a safe haven to come and speak freely, and to make the connections that they need to make to get what they want done.

The use and design of our Resiliency Hub are intended to be responsive to the needs of the community. We talked to different people in the community about what this could be if this building was converted into a Resiliency Hub and we got an overwhelming response in favor of bringing it there. We wanted to be multi-generational so we brought in youth and elders of the community. We found the "unelected mayor" and he directed us to who we should talk to. We created a Community Advisory Board so that we would have church members, parents, grandparents. The board guides the activities and the direction that we'll go in. We are advocates for community-controlled funds, because we know that a lot of the expertise is right there in the community.

We're hoping that Petersburg will be an example of a successful Hub that can be replicated, though there is no one size fits all, no template.

Each Resiliency Hub will be different according to the needs of that community. I'd advise others interested in Resiliency Hubs to get with your stakeholders, talk to community members, talk with the elected officials, see what funding is available. Allow the community to dictate what they would like to see in that space. In terms of resiliency, it may be a source of food, a place for informal meetings and networking, or a youth center. It's going to depend on what that community says it needs. Be prepared to have hours and hours of conversation, because you might hear different things from different people.

To ensure that the focus of Resiliency Hub services remains on the needs of the immediate community, create a Community Advisory Board. This ensures that the Hub will stay locally focused and that it won't become a situation where someone from the government starts imposing their will on how the hub should function. Leave that space for trial and error. Allow the community and Hub to self-correct. Have the openness of communication for everybody to come together and for everyone to be heard and bring those people to the table. Respect their voices. Because each community is different, the first step is to identify what residents might need. Think of possible challenges and hazards, and then start planning for those.

We can't deny that climate change is happening and that our communities are distressed. Some are far less equipped to deal with it, whatever may happen. I would encourage communities to start thinking along those lines that we need to have a blueprint. People need to know where they'll be able to go in the event of a crisis. So, let's just try to be prepared. We can't wait until the water is coming up over the sidewalk to start saying, "Where can we go for shelter and safety?" (Queen Shabazz, CEO, Virginia Environmental Justice Collaborative—Practitioner view, 12 January 2023)

2. Introduction

The effects of climate change are altering the environmental and social realities of communities around the world. How communities prepare for and respond to environmental changes will likely depend upon both the social structures of communities and environmental infrastructure (Thomas et al. 2018). Not all communities are equally positioned to prepare for the changes to come and those that are already occurring. In the United States, racial and ethnic minority communities, primarily Black and Hispanic neighborhoods, disproportionately experience the effects of climate change, compared with majority-White communities. The discrepancy between these communities will be exacerbated by climate change in the coming decades, and communities within the United States need to actively work towards an equitable climate change resiliency strategy (Berberian et al. 2022;

Thomas et al. 2018). Resilience Hubs have the potential to be transformational spaces for marginalized communities facing climate change through the promotion and support of community-driven self-reliance.

The systematic marginalization and social disenfranchisement of minority communities across America has created patterns of unequal access to the resources needed to combat climate change (Thomas et al. 2018). Climate resource needs are not limited to tangible climate-based infrastructure projects or engineering feats of design, such as disaster warning systems and flood walls; communities also need social infrastructure resources, such as accurate information communicated in native languages (Davies et al. 2018), access to liquid capital before and after hazard events, and functional connections with community support networks (Thomas et al. 2018). The critical role of social networks and social capital has been generally shown to contribute to community resilience, especially in marginalized communities made vulnerable to environmental disasters due to historic patterns of environmental racism situated within larger social systems of oppression. Resilience Hubs are community spaces intended to support the social infrastructure of communities and aid in the equitable distribution of resources before, during, and after climate-induced emergency hazard events (Baja 2018).

In this chapter, we argue that community-created Resilience Hubs can provide critical social infrastructure with which to address the disproportionate impact of climate change on environmentally vulnerable communities. The community-driven development of Resilience Hubs can circumvent reliance on traditional governmental power structures for resource provision. Investment in these community-based resources is a way to develop the social and physical infrastructure support needed by environmentally vulnerable communities to confront the threats of climate change. This paper helps to inform and support the community-driven development of these spaces.

3. Background

Black and Hispanic citizens across the United States are more likely to live in areas that will experience greater temperature extremes, a higher risk of flooding, and air pollution (Environmental Protection Agency 2021; Marlow et al. 2022). The studied impact of increasing temperatures across the United States has focused on the concept of "heat island" effects in urban areas, specifically urban areas lacking in green space and tree canopy combined with a high concentration of impervious surfaces. A study by Jesdale et al. (2013) examined these heat islands across the United States and found decreased tree canopy as well as increased impervious surfaces to be associated with residential areas historically segregated by race and currently populated by marginalized communities. This pattern of disproportionate impacts on marginalized communities was again demonstrated in 2017 in Houston, Texas, during the extreme flooding caused by Hurricane Harvey. Chakraborty et al. (2019) documented the extent of flood waters across Black, Hispanic, and

socioeconomically deprived neighborhoods as significantly increased as compared to White, affluent neighborhoods. Historic U.S. federal and state government redlining policies relegated minority communities across the country to areas adjacent to industrial facilities and high-intensity development, disproportionately exposing many to a lifetime of industrial air pollution (Boone et al. 2009).

The health and wellbeing of residents in minority neighborhoods are at higher risk than residents in White neighborhoods partly because of the physical environment in which they live (Bullard 2005). Many marginalized communities that have been subjected to a multitude of environmental injustices for decades are now also vulnerable to experiencing the brunt of climate change. The scope of the environmental justice movement has focused historically on the ongoing threats and risks posed by already-polluted and -damaged environments in which marginalized people live, work, and play; more recently, the movement has expanded to include climate change injustice. The implications of climate change may be global, but the consequences are experienced locally. The compounding of environmental injustices with climate injustices poses an increasing threat to both the physical and social wellbeing of marginalized communities.

As climate change worsens, the growing physical and social vulnerability of environmentally marginalized communities are inevitable. Social vulnerability is the susceptibility of a social group or community to environmental hazards or stressors in addition to the corresponding ability of said group or community to prepare, manage, and recover from the impacts of these hazards and stressors (Otto et al. 2017). The social impact of heat island effects, for example, is especially taxing on marginalized communities. Patterns of heat exposure have been shown to delineate along lines of social inequity (Renteria et al. 2022). The literature has documented that neighborhoods with greater heat exposure are negatively correlated with lower incomes and education (Otto et al. 2017). During heat waves and periods of extreme rainfall, marginalized communities are more likely to experience violent crime and increased rates of aggressive citizen behavior, leaving residents exposed to negative changes in social behavior (Otto et al. 2017). Madrigano et al. (2018) found, in New York City, that a lack of access to in-home air conditioning during heat waves was also indicative of limited access to services, resources, and social mobility within Black communities.

Often cities and local governments will open or establish cooling shelters as a resource for a community to ameliorate the impact of extreme heat. These cooling shelters are set up in public spaces and are available for residents who otherwise would not have access to a cooled space; however, these spaces are often inadequate and only address the physical needs of a community, while failing to understand or address the social needs. In Los Angeles, Shonkoff et al. (2011) explained that the lack of transportation options for many minority and ethnic communities precludes many residents from gaining access to cooling shelters; the residents with the greatest need could not travel to shelter locations. Meanwhile, in New York City, Madrigano

et al. (2018) found that when cooling shelters were opened and readily accessible by public transportation, many residents still chose to stay home in the heat rather than go to the shelter because they feared the unknown or did not want to be around strangers (Madrigano et al. 2018). The residents preferentially chose to isolate at home and suffer the heat because they were not connected meaningfully to the people in their community.

These studies point to the need for sweepingly different climate change adaptation measures rather than policy incrementalism and focusing climate inequity efforts along the margins of environmental injustice; the cooling shelters discussed above will fail climate-vulnerable communities if the barriers present are not concurrently addressed. Policies that exclusively address the physical impacts of climate change do not address the resource gap between climate mitigation, environmental racism, and social justice. Going forward, marginalized communities will need both accessible physical resources and social resources to ensure the adaptability of individuals and whole communities to the changes caused by climate events.

Social vulnerability within a community is often reflected in the availability of real alternatives and resources to community members in the face of an environmental hazard. In the vignette above, Ms. Shabazz points out that residents in Petersburg, VA, are beginning to experience the impacts of climate change but lack real alternatives or the resources necessary to respond to the city's environmental changes. Instead of working within the political or bureaucratic governmental systems, community organizations came together to establish a Resilience Hub. In Petersburg, social connectivity is driving community resilience rather than government planning and spending. The VEJC was mobilized to action partly due to a lack of alternative options offered by the city. The VEJC, by acting outside of the standard policy process, has created real alternatives and opportunities for community climate resilience. Other communities can learn from Petersburg that climate action is not dependent upon a planned government response, but can be a grassroots effort. Cities and local governments can, in turn, learn to support as well as encourage community-driven resiliency work and incorporate community leadership in formal climate action policy and planning.

Social vulnerability is not a static condition; it is dynamic and worsens or improves in response to changes in community preparedness for and resilience to dealing with environmental hazards. Adepoju et al. (2022) studied the adaptations made in four minority communities in Houston, Texas, in response to the successive events of Hurricane Harvey and Winter Storm Uri. They found that "social connectedness was key to disaster resiliency; previous disasters reinforced the importance of staying connected to family and friends" (Adepoju et al. 2022, p. 9). Residents were able to use their experiences during Hurricane Harvey to improve their outcomes following Winter Storm Uri, demonstrating a decrease in their social vulnerability through increased community connections. Communities unable to

adopt new strategies to prepare for, manage, and recover from environmental disasters and hazards become even more vulnerable to climate change. Community resilience is a critical deciding factor in community success in the face of ongoing climate change.

4. Definition and Context

4.1. Community Resilience

Resilience can be understood as the preparation for and adaptation to change and disruptions (NIST 2018). Community resilience, in the framework of climate change, is the collective capacity of a community to adjust to post-disaster conditions and protect itself from the cumulative impact of climate change. Pre-disaster mitigation strategies that enhance community resilience, such as the Resiliency Hub in Petersburg, Virginia, are being implemented in many areas of the United States. The Resiliency Hub functions to create alternatives to neoliberal society through community-driven approaches to environmental and economic problems (Cretney 2014).

Varying degrees of transient post-disaster stress can be expected before recovery or adaptation, even in the most resilient communities (Norris et al. 2007). Over-exposed communities, however, can experience persistent post-disaster dysfunction because they have lower levels of community resilience (Bergstrand et al. 2015). This persistent dysfunction is partially due to a lack of political connections, depressed socioeconomic status, and stunted social capital, all of which are necessary to secure adequate support and resources, such as shelter, electricity, food, and medical supplies, following a disaster (Kaniasty and Norris 2004). The goal of enhancing community resilience can seem superficial in that it does not redress the systemic and structural racism that created the lack of political connections, depressed socioeconomic status, and stunted social capital of at-risk communities. Resilience is not necessarily a positive outcome, especially if the current state of a system or community is in a state of stress or dysfunction (Béné et al. 2012).

Resilience does have the potential to exist as a conduit of transformation (Nelson 2014). This can occur through a disruption that causes a shift in the state of a system or community to one with more favorable conditions (Walker et al. 2004). While there has been a shift in the federal government's climate disaster focus from infrastructure-only approaches toward community-resilience-focused approaches (FEMA 2021), transformative approaches to resilience are not likely to originate from the federal or state government. The existing dominant political power structures that created community climate and social vulnerability through policies and practices are often not capable of disrupting their own power structures. In the absence of systemic changes that create more equitable systems through reforms in regulations and policies, government-originated resilience, while aiming to avoid persistent post-disaster dysfunction, is more likely to uphold the "status quo" of dominant

political structures (MacKinnon and Derickson 2013). Federal and state governments' "lack of acknowledgement of politics, power, inequality and agency provides fertile ground for those wishing to perpetuate neoliberal ideology to engage resilience as a tool" (Cretney 2014, p. 637).

Community use of resilience is transformational when it challenges the values of neoliberal subjectivities (Cretney 2014). The Resiliency Hub in Petersburg, Virginia, co-created with community members, echoes the needs of the community. This means that the hub serves as a place-based source of investment into economic and social capital for the local community. The creation of the Hub has already sparked a revitalization of the local area. Properties that were vacant are being rehabilitated, and local economic capital will be stimulated through educational workshops, training, and certifications. Investing in the development of the skills and resources of a community in addition to strengthening the local workforce, so that community residents can provide for their families, are vital to the revitalization and resilience of local communities. The Hub enhances social capital by serving as a place of fellowship where members can convene and use the space for their needs. It is imperative that the co-creators of community resilience acknowledge the ways that dominant social structures created conditions of vulnerability in the first place (Banzhaf and McCormick 2012).

Within the community resilience framework, social capital is a primary conduit by which resiliency is created, established, and nurtured. Targeted resources that encourage connections with family, friends, neighbors, and other community members are essential in gaining access to disaster support and resources (Norris et al. 2007). Social networks often serve as initial first responders after an adverse event, with neighbors checking on one another and providing critical aid as well as support (Aldrich and Meyer 2015). The Petersburg Resiliency Hub is not just a resource during a climate disaster, but a transformational space of revitalization. It disrupts the economic and social inequalities produced by structural and systemic racism as well as neoliberal subjectivities by co-creation with the community. The Hub remains aligned with the community's goals and priorities through collaborative decision making. The co-creation process also empowers communities and builds community ownership of and trust in the Hub. This allows for a focus on the immediate needs of the community, disrupting the dominant structures' use of resilience as a tool of hegemony.

4.2. Social Capital

Social capital is fundamental to the development of community resilience. Building ties within and across social networks enhances access to the resources most essential to communities in the face of disaster. Social networks allow access to financial and non-financial resources, such as loans, gifts, information, emotional support, shelter, childcare, rescue, and aid (Kaniasty and Norris 1993; Hurlbert et al. 2000; Elliott et al. 2010). During a disaster, not only do government and

nonprofit organizations provide financial and non-financial resources to community members; the provision of resources also occurs through other community members, community-based organizations, and faith-based organizations. The conceptualization of social capital by Bourdieu (1979) denoted the ties within one's social network as a collective resource of potential economic and cultural capital.

Ties within and across social networks can increase social capital in the form of bonding, bridging, or linking. Bonding occurs horizontally between socially cohesive homogeneous groups, or individuals with shared identities, and is important for forming social cohesion and support (Szreter and Woolcock 2004; Granovetter 1973; McPherson et al. 2001). Bonding also happens via relationships with family and friends. Bridging occurs horizontally across groups of loosely connected heterogenous individuals that do not have shared identities and is important for generating solidarity and respect (Szreter and Woolcock 2004; McPherson et al. 2001). Bridging happens through membership in organizations such as religious groups, sports and other clubs, and parent–teacher associations (Small 2009). Linking occurs vertically among groups or individuals of different levels of political mobility and socioeconomic status, which often provides greater access to social power and vertical mobility (Szreter and Woolcock 2004). Linking happens via interaction with local leaders, community-based organizations, and local governments.

Communities and individuals can have different levels of bonding, bridging, and linking social capital. Strong social ties among homogeneous groups that occur within bonding social capital can inhibit the transmission of information because of the homophily that limits a broader outlook of the world (McPherson et al. 2001). A lack of bridging social capital can impair resilience due to the inability to secure resources and information across heterogeneous groups (Hawkins and Maurer 2010). Resilience Hubs can serve as a physical location where social connection links can be fostered. While there has been little focus on the vertical structuring of organizations and societies within the context of social capital (Kwon and Adler 2014), Resilience Hubs that are co-created with communities create bridging and linking ties in the community. Frameworks of social capital often fail to acknowledge the economic and political factors that create social capital (Mohan and Mohan and Mohan 2002); however, social capital not only explains the creation and sustainment of dominant structures but also addresses the persistence of these power relations (Woolcock 2001). The social capital framework "recognizes that exclusion from economic and political institutions is created and maintained by powerful vested interests, but that marginalized groups themselves possess unique social resources that can be used as a basis for overcoming that exclusion, and as a mechanism for helping forge access to these institutions" (Woolcock 2001, p. 16). The co-creators of community resilience can play a role in overcoming the exclusion of these institutions through staying locally focused and actively informed by communities.

Resilience Hubs amplify community resilience through the building of social capital. Resilience Hubs are the physical structures that facilitate social interactions

by gathering residents to work together, engage in community decision making, and build the needed bonding, bridging, and linking social capital (Baja 2018). Hubs can provide the most vulnerable marginalized communities with the tools with which to protect themselves from increasing climate change burden, as well as the ability to adapt post-disaster. Practitioners and co-creators of community resilience must navigate the complex power dynamics that shape social capital. This is because "power differentials are a result of systemic racism, and they are reified and perpetuated in the built world. Part of the creative act for practitioners working in vulnerable communities is to find ways to use their problem-solving skills to actively refute those systems of oppression, and then also know when it is time to get out of the way and let the community drive the project" (Walsh 2018, p. 184).

The Petersburg Resiliency Hub navigated these complex dynamics by recognizing the expertise of the community. Connecting with the "unelected mayor" allowed for an entry point into the community so that they would not be met with hostility as "outsiders". The creation of a Community Advisory Board that guides the direction of the Hub taps into existing resources and knowledge in the community to support the community. The Hub can also serve as a place at which to access political institutions and political leaders in the community. Bringing the mayor and other elected officials to the Hub gives community members a way to voice their needs and concerns, while building connections to dominant systems. The Petersburg Resiliency Hub is actively using this transformative approach to navigate and contribute to bonding, bridging, and linking social capital, which addresses the persistence of these power relationships.

5. Resilience Hubs as a Transformational Resilience Tool in the United States

A one-size fits all approach does not apply in the case of Resilience Hubs, as they are intended to be flexible and responsive to community needs (Murray and Poland 2020). This is reflected by the Urban Sustainability Directors Network (USDN), which states the following: "Resilience Hubs, defined and led in partnership with members of the community, should meet the unique needs of residents and organizations in that neighborhood. This means that no two Resilience Hubs are likely to be identical" (Baja 2018, p. 4). Resilience Hubs are most effective when partnerships are developed with and between community members. An authentic partnership respects local expertise that can lead to systemic change, and "this is especially true when they [partnerships] are conducted with awareness of larger systems, and in collaboration with other coalitions working to resist systems of oppression, as well as to create new structures supporting a just transition to a regenerative economy" (Walsh 2018, p. 182).

Hubs should provide opportunities for social capital bridging and linking within communities through engaging with local private businesses, faith-based organizations, and agencies that have an established level of rapport with the community. Partnerships should be led by the community and include vulnerable

and marginalized community members to enhance equitable outcomes (Murray and Poland 2020). Hubs increase bridging and linking social capital through the sharing of community information, providing access to political mobility, and increasing the ability of citizens to communicate directly with local governments about their specific needs. Resilience Hubs advocate for communities and provide resources in alignment with community needs. Hubs cannot exist without the trust and support of community members. Involving communities in the decision-making process is essential in the creation and design of a Resilience Hub. This centers the perspectives and voices of communities in the design, implementation, and evaluation of Hubs. Resilience Hub development can serve communities by strengthening bridging and linking social capital, which catalyzes cooperation between local governments and community-based organizations. Social connections, a sense of belonging, and access to resources are strengthened through these Hubs. It is notable that using known and trusted spaces in communities for disaster relief increases their utilization during disasters (Mazereeuw and Yarina 2017). Resilience Hubs are often community-managed facilities, such as civic centers, convention centers, libraries, or churches. Regardless of the primary function of a Hub, the location should be familiar, trusted, and accepted by residents. The Resiliency Hub in Petersburg is unique in that it utilized an existing structure with historical significance as a United Service Organization (USO) facility for African American troops during military segregation in World War II. The location is known to the community and the restoration of the building is leading to a revitalization of the area, in part through an increased interest in the purchasing of nearby abandoned properties. Resilience Hubs often serve multiple functions for disaster relief: community engagement centers, relief stations, and/or disaster shelters. Some Hubs may serve only one of these functions, and others may serve as all three. The Resiliency Hub in Petersburg functions as a place of fellowship, education, and resources, as well as a shelter from heat and climate events.

Because vulnerability is not static, damage sustained to Hubs during a disaster reduces community resilience. Redundancy of resources can serve as a stalwart against declines in community resilience, particularly in the face of repeat disasters. If there is no redundancy, then the community will remain vulnerable and could suffer from persistent post-disaster dysfunction (Norris et al. 2007). Therefore, the Resilience Hub itself must be prepared for single- and chain-event vulnerabilities to disasters such as flooding, extreme heat or cold, and wildfires. The Hub should be equipped with backup power systems so that electricity is available during outages (de Roode and Martinac 2020). The Urban Sustainability Directors Network, the USDN (Baja 2018), recommends a hybrid system that includes a mix of power generation and storage, such as a Hybrid Resilience System (HyRS).

Communities should be assessed for the threats that they face and their ability to withstand these threats (Ribeiro and Bailey 2017). The condition of and current use of a proposed physical Resilience Hub site, as well as the size, its accessibility to

elderly and disabled individuals, and its vulnerability to climate disasters should be taken into consideration when assessing the suitability of a Hub location (Baja 2018). This means assessing a community's overall vulnerability by evaluating if the community is urban, suburban, or rural, vertically mobile or not, its socioeconomic status, and the availability of transportation to the Hub. Understanding the complex power dynamics and how they intersect to impact a community allow for the identification of specific points (Meadows 1997) of focus that, when addressed, impact the connected systems (Walsh 2018).

The mitigation of the effects of climate change and climate change disaster cannot be addressed through physical infrastructure approaches alone. Transformational community resilience is essential in the implementation of social and political strategies to address climate change. Black and other marginalized communities that have historically been displaced into high-risk climate disaster areas, such as floodplains and urban heat islands, may also have unequal access to support and resources. Their collective capacity to protect themselves from cumulative climate change burden and their ability to adapt after a disaster rely on a joint effort among community members. A transformational approach through the use of Resilience Hubs, such as the Hub in Petersburg, is not only responsive to the effects of local climate disasters but also promotes ongoing systemic change and neighborhood revitalization, such that a community is not in a state of perpetual hypervigilance against potential disasters. Local actions can have long-term and significant impacts (Walsh 2018).

The VEJC took purposeful steps in the creation of the Petersburg Resiliency Hub. The VEJC's efforts were unique, in order to meet Petersburg's needs, but may serve as guidelines for others to incorporate into their own community-driven processes. Communities interested in developing resilience solutions can use the Petersburg Resiliency Hub and other existing Hubs as prototypes. The VEJC connected with stakeholders and community members. Community members and community representatives were engaged early on to ensure community support of a Hub. A Community Advisory Board was put into place to guide the activities and direction of the Hub. An advisory board dictates the use of a Hub based on the needs and perspectives of a community. The VEJC worked to leverage resources and secure external funding to restore the building and install solar panels. They planned for the possible hazards that the community might face so that they can be prepared to support the community. The creation of each Hub is unique and often one of trial and error. Additionally, there are resources beyond the Petersburg Hub; for example, there are organizations such as the USDN that offer support and guidance to communities developing their own Resilience Hubs.

6. Conclusions

There is little debate that climate change poses a real and escalating threat to the planet and its inhabitants. All communities must address current climate events

and prepare for impending challenges; however, decades of environmental injustices in the United States have created significant disparities between marginalized neighborhoods and majority-White neighborhoods. This means that some of these neighborhoods, especially those most susceptible to climate impacts (e.g., coastal regions of the country exposed to increasingly severe hurricane and flooding events), are already disadvantaged in facing such an overwhelming challenge. Residents of the most environmentally vulnerable neighborhoods often struggle for adequate funding and support to navigate social, political, and environmental solutions at a local level.

One of the most important characteristics of communities that successfully coalesce and advocate for change is resilience. Can resilience within at-risk communities be developed, nurtured, and sustained? Creating lasting resilience is realizable through community-driven initiatives that bring a transformative power to countervail traditional political power structures. Resilience Hub development is one transformative approach that can build community strength and capacity in the face of climate change. The responsibility to prepare for and respond to climate change is incumbent upon federal and local governments, while nonprofit organizations and local businesses can assist in identifying climate change threats to communities, developing feasible solutions, and implementing local climate disaster mitigation plans. Traditional power systems have historically failed to prioritize the environmental conditions of marginalized communities. The paucity of changes in dominant systems to promulgate equity through policy and regulation reforms means that a top-down approach cannot result in significant transformational resilience. Resiliency created by communities for communities has a stronger likelihood of creating the transformative change that a community needs to combat climate impacts.

Human resilience, both individually and as groups, is critical for citizens to effectively address negative climate events at all levels of society. As a foundational component of community resilience, bridging and linking social capital, built through interactions across heterogeneous groups, is invaluable to climate change resilience. This paper stipulates that Resilience Hubs are an accessible and flexible tool that can be developed within vulnerable marginalized communities to meet the challenge of inevitable climate disasters. In working to co-create transformational community resilience through Resilience Hubs, it is crucial to address systemic power imbalances, foster community ownership, promote intersectoral collaboration, and advocate for equity and inclusion. The co-creation of Hubs with local residents also guarantees that Hubs are centered on the needs of communities and their buy-in of Hubs in addition to their functions and activities. Collaboration with stakeholders and the utilization of available resources and grant funding can help the long-term sustainability of Hubs. Finally, addressing the socioeconomic, cultural, and political forces that created the vulnerability and marginalization of communities ensures that Hubs are equitable and inclusive, leading to truly transformational resilience.

The authors encourage formal research on the effectiveness of the Resilience Hub model in building community resilience to more effectively address inevitable climate change problems.

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