Climate Resilience through Community Resilience: A Model for Engaged Design from Coal Country

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ABSTRACT

In 2021, the authors launched Climate Resilience through Community Resilience, a multi-year engagement in Central Appalachia between the University of Kentucky's Studio Appalachia and Hazard KY, approximately two-hours away. Challenging the traditional expert-client relationship, the initiative aligns local expertise, community leadership, and design capacity to address both historical disinvestment and the compounding effects of climate change in the region through sustained engagement and participatory design.

There are multiple examples of design pedagogies with robust components of community engagement, notably the University of Minnesota's multi-year engagement in North Minneapolis and famously Auburn's Rural Studio. Likewise, there are multiple examples of design pedagogies addressing the climate crisis. Less prevalent are ongoing institutional projects that apply sustained community engagement methodology to climate resilience, particularly in a rural setting far afield from the university campus.

This paper articulates the urgency and the precarious nature of climate resilience in the region; situates our program design within broader engagement and pedagogical practice; and introduces an assessment method as a means of documenting potential impact.

INTRODUCTION

Central Appalachia has been beset by historic flooding events in recent years – amplified by both climatic changes and the topographical legacy of surface mining. Appalachian communities, particularly energy-transition communities, will continue to face weather events due to climate change, leaving many grappling with next steps for a more resilient future.

The economic challenges of Central Appalachia are well documented. Less commonly acknowledged, both nationally and even in the region, is the re-emerging vitality of many mountain communities – new restaurants, breweries, coffeehouses, arts centers, and growing population. These elements of a robust community are the foundational ingredients of the resiliency necessary to thrive in the current era, however, in the aftermath of these last rounds of floods, outside interests came to what they presumed to be self-evident conclusions—that communities should just move, surround themselves with floodwalls, or disband altogether. Such technocratic approaches too often disenfranchise our communities, excluding them from articulating their own future and reinforcing an anti-institutional political narrative. Of note, in ongoing flood recovery, FEMA is offering buyouts of buildings in the flood plain. As a matter of practice, these properties are then demolished and permanently removed from productive use, leaving communities with gaps in their downtowns and reducing an already limited tax base.

Climate resilience might best be understood as an adaptive problem, as opposed to a technical one. The concept of adaptive problems was first articulated by Harvard's Ron Heifetz and Marty Linsky. Technical problems have data-driven answers, such as medical diagnoses or crop management. Adaptive problems require creative work by those most impacted, often within the political or societal realm. While climate adaptation clearly requires aggressive technical action on a global scale, the sustainability of solutions is dependent upon local adoption and implementation.

The social sciences have long acknowledged the role of social capital in resilience and recovery, and practitioners have developed frameworks for community-based climate planning. Drawing from such findings, our work is reliant upon robust social networks between scholars and community, mutual transfer of knowledge, and divesting of ownership to community leadership expressed through a pedagogical framework of participatory design and a program design framework of sustained engagement. Rooted in the planning traditions of Territorialism and Arnstein's "Ladder of Participation" Climate Resilience through Community Resilience starts with the conviction that local expertise and agency is necessary to lead sustainable design and planning solutions to the climate challenge.
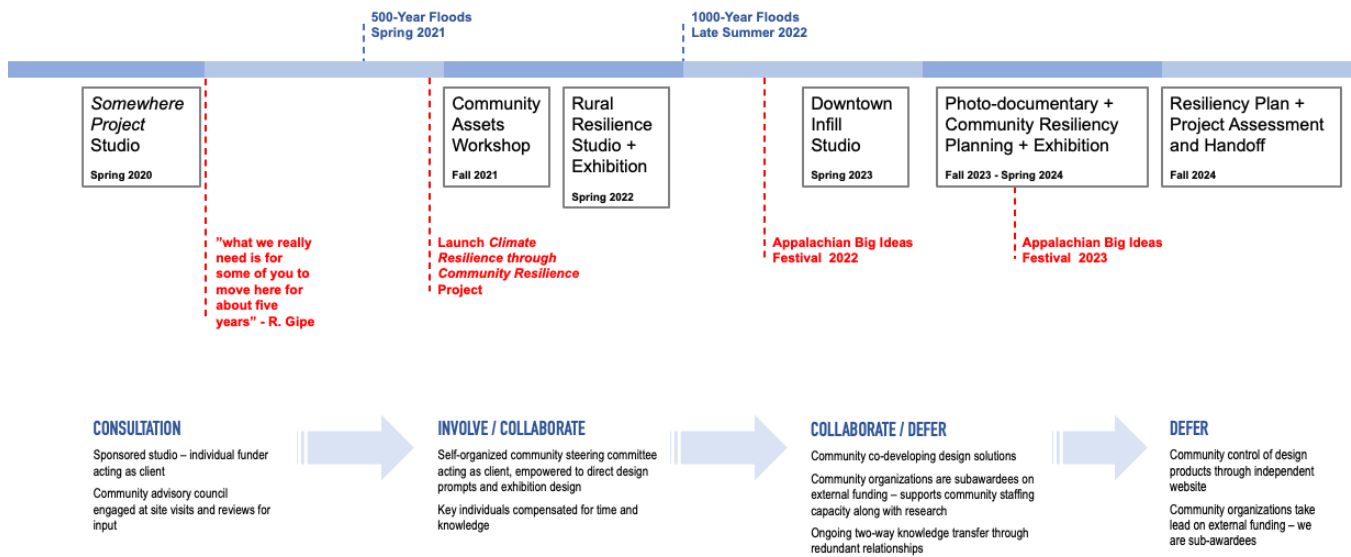
Figure 1. Project timeline with major climate events alongside key milestones and engagement mechanisms. Image: Authors

PROGRAM DESIGN

Climate Resilience through Community Resilience was launched after two discrete events. First, the region experienced the first of two 500-year floods within eighteen months. Second, during the Spring 2020 final reviews, a community member opined, "we just need y'all to move here for about five years."

The first event drove home the reality of climate impacts in the region. The second, that we had not moved beyond what Lorlene Hoyt calls "Tentative Engagement."

Based on her work with MIT@Lawrence, Hoyt articulated five stages of university engagement: Pseudo-Engagement, Tentative Engagement, Stable Engagement, Authentic Engagement, and Sustained Engagement. She goes on to propose two overarching strategies for achieving Sustained Engagement between the university and community: (1) Invest in human relationships and (2) leverage coursework and scholarship to move a longer-horizon agenda forward.

The reality for most design students is that a design studio will primarily take place on campus over the course of 15-weeks. Even studios with "place-based" projects only muster limited engagement with stakeholders. If they do, it tends to resemble a typical community meeting – scheduled in the evening on a weeknight and open to the self-selected crowd that shows up. Invited community members may be involved at mid-term and final reviews. From a community impact perspective, the process is unsatisfactory at best and extractive at worse—using up community time and resources primarily for the benefit of the students.

Utilizing a different model of engagement, faculty leadership for Climate Resilience through Community Resilience leveraged existing and new relationships with community leadership to identify a standing steering committee for the project. Committee members were co-collaborators from the outset – identifying the design prompts, providing ongoing critique throughout the courses, and generating course content about the region and project site. For their role in providing local expertise, they were compensated. Also, our community partners retain the authority to disinvite us from the region. This level of accountability is vital in balancing the University-Community power dynamic that often pervades work in historically underserved regions like Central Appalachia.

By working with a single community and committing to at least four years of engagement, the project can move beyond initial impressions and engage in longer-horizon co-creative design processes. As Gipe later pointed out, "we tend to get tired of being rediscovered every couple of years."

PEDAGOGICAL FRAMEWORK

In terms of studio instruction, we deploy a participatory design framework to ensure active participation from all stakeholders. In doing so, the process strives to encourage shared responsibility and engagement throughout the process. The resulting design interventions more fully express the values and intentions of the community partners. Our adoption of this framework aspires to democratize the design process as a means for citizen control in the design process. Strategies deployed in this initiative aim to involve a diverse range of participants: stakeholders, community members, local designers, researchers, and students from the university, ensuring that all voices are heard and considered throughout the process.

Figure 2. Students and community leaders on a site visit in downtown Hazard KY. Image: Authors

Participatory design promotes co-creation and co-learning between designers and participants. Team members collaborate closely with stakeholders to collectively generate ideas and implement them throughout our engagement. This approach fosters a sense of ownership and empowers participants to contribute their knowledge and experiences to the projects. The process intentionally engages participants in ways that encourage all to contribute to meetings, site visits, and design development. By committing to ongoing, iterative engagement with the partners, we make space for ongoing feedback, reflection, and adaptation.

PROJECT WORK TO DATE

Beginning in Fall 2021, Interiors graduate students assessed three community assets, each an underutilized but promising building or space in the partner community. The projects were jointly determined by the steering committee and students at the semester's outset. Each study team undertook multiple site visits and worked alongside the clients to develop practical proposals. To varying degrees, each of the studies was implemented by the city.

In Spring 2022, a joint Interiors and Architecture graduate design studio undertook a robust visioning of sustainable economic-develop opportunities downtown and on reclaimed mine sites surrounding the city. Work from this semester was intentionally more aspirational, resulting in a public exhibition to provoke public conversation about a post-coal economy. The provocation was invited and managed by community leadership, allowing for productive discourse that would have been elusive without them.

Over the following summer, faculty and students were invited to design and fabricate a kayak shelter along the river downtown. Unfortunately, the project was interrupted by another round of historic flooding, which redirected our community partners for most of Fall 2022.

Concurrent with the first two years of the project and despite the floods, the community continued to make strides on its downtown redevelopment, including the clearing of a burnt-out hotel on Main Street. In Spring 2023, students explored in-fill development concepts for the site. Their work was augmented by the conceptualization and execution of a downtown mural during the semester. Their work was shown at the city's economic

CLIMATE-RESILIENT COMMUNITIES
A Logic Model for Place-Based, Community Responsive Design

There is an urgent need to create responsive, human-scaled, resilient places in Appalachia that are adaptive to climate change while also considerate of the region's cultural realities.

This project seeks to respond to and prepare for climate change in marginalized regions by cooperating with members of the Appalachian community in Hazard, Kentucky. Using collaboration, creativity, and foundational interior design research, the project allows students, faculty, and community partners to co-create plans that address climate resiliency and cultural heritage.

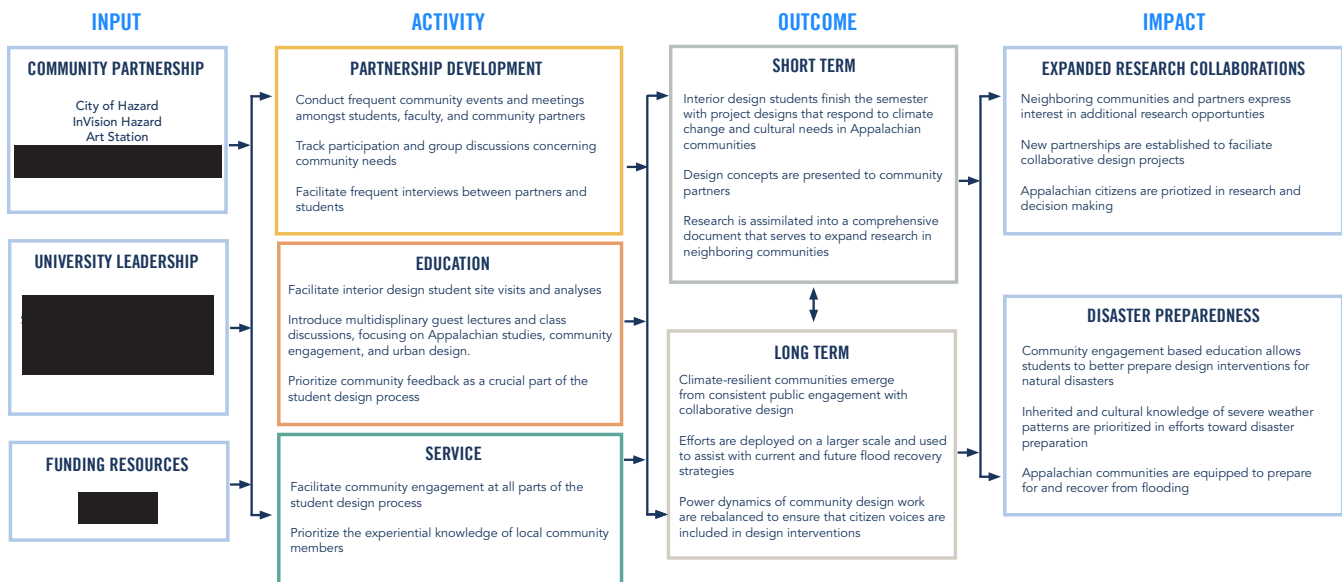| INPUT	ACTIVITY	OUTCOME	IMPACT
COMMUNITY PARTNERSHIP City of Hazard InVision Hazard Art Station	**PARTNERSHIP DEVELOPMENT** Conduct frequent community events and meetings amongst students, faculty, and community partners Track participation and group discussions concerning community needs Facilitate frequent interviews between partners and students	**SHORT TERM** Interior design students finish the semester with project designs that respond to climate change and cultural needs in Appalachian communities Design concepts are presented to community partners Research is assimilated into a comprehensive document that serves to expand research in neighboring communities	**EXPANDED RESEARCH COLLABORATIONS** Neighboring communities and partners express interest in additional research opportunities New partnerships are established to facilitate collaborative design projects Appalachian citizens are prioritized in research and decision making
UNIVERSITY LEADERSHIP	**EDUCATION** Facilitate interior design student site visits and analyses Introduce multidisplinary guest lectures and class discussions, focusing on Appalachian studies, community engagement, and urban design. Prioritize community feedback as a crucial part of the student design process	**LONG TERM** Climate-resilient communities emerge from consistent public engagement with collaborative design Efforts are deployed on a larger scale and used to assist with current and future flood recovery strategies Power dynamics of community design work are rebalanced to ensure that citizen voices are included in design interventions	**DISASTER PREPAREDNESS** Community engagement based education allows students to better prepare design interventions for natural disasters Inherited and cultural knowledge of severe weather patterns are prioritized in efforts toward disaster preparation Appalachian communities are equipped to prepare for and recover from flooding
FUNDING RESOURCES	**SERVICE** Facilitate community engagement at all parts of the student design process Prioritize the experiential knowledge of local community members		

Figure 3. Diagram of engagement strategies and assessment tools. Image: Authors

development offices for ongoing implementation discussion, with one project selected to continue development with the assistance of an undergraduate researcher.

Recently, a survey of the first two years was exhibited at a regional conference hosted by the community. Additionally, the work is being archived on a community-controlled website. Each set of projects was informed by multiple site visits, community-engagement activities, and ongoing exchanges with community leadership.

Along with the student work, faculty have provided technical assistance to the community, co-written funding applications, and curated the digital archive. The ongoing relationships between multiple faculty and multiple community leaders is intentional and vital to sustaining a robust level of engagement. While students will benefit from their time working with the region, the mutual benefit of all parties is strengthened by committing to the long slow work of sustained engagement.

ASSESSMENT
Climate Resilience through Community Resilience is entering the third year of a four-year commitment. In addition to the established design process outcomes, the project also attempts to (1) demonstrate how we might effectively assess ongoing

engagements and (2) better situate the work within the research portfolio of an R-1 university.

Utilizing a partner-development model from the National Institute of Environmental Health Sciences (NIEHS) Partnerships for Environmental Public Health (PEPH) program, we crafted a set of metrics to document the progress and measure success of the project through the lens of partnership development within the community.

Specifically, we documented the following:

- Interactions between partners and students/faculty.
- Partners who contributed to identifying design ideas.
- Opportunities for partners to provide input to studio.
- Design adaptations made to reflect cultural appropriateness and user feedback.

The selected metrics focus accountability for measurable inputs and outputs that flow to less tangible collective impacts. In the case of sustained engagement through partnership development, our program design articulates responsibilities of the institution, such as appropriate compensation for community time and effort and amplifying the voices of community

Figure 4. Sample projects from interdisciplinary student design teams. Image: Courtesty of the authors

representation. The following inputs and outcomes were documented during and after the Spring 2023 semester.

INPUTS:

Throughout the semester, the lead faculty member reinforced the collaboration with opportunities to share insights, knowledge, and project feedback. In the studio and classroom, the pedagogical approach involved regular site visits, site analysis, city tours, overnight visits, reviews of student work with diverse perspectives. Over the semester, students and faculty regularly met with community partners, totaling nine events. Before the semester began, the lead faculty member met with community partners twice to discuss site selection, timeline, planning, and travel. During the semester, the research team met with community partners to discuss site visits and external grant opportunities.

The community partner visited the studio on campus at the beginning of the semester to provide a lecture and to present areas that they would like to see developed or designed. Students and the community partner collaboratively selected a site during the initial consultation. During the semester, students traveled to the region twice. Once at the beginning of the semester and once at mid-term. The first visit was to be able to meet with community partners and visit the city to learn more about the site and conduct interviews. During this visit, students collected site information and heard from community partners about their ideas and needs for their community.

During the second visit, students met with various partners and conducted walking tours, had informal interviews, gathered site information, documented site conditions, participated in a community design mural project, and met with community members. Students and community leaders presented initial ideas and developed next steps based on feedback from community members. The students also traveled to a neighboring community that sustained significant flooding damage and heard firsthand narratives about their flood recovery efforts as well as impacts to their broader community. Students participated in a walking tour, creative writing workshop, and square dance during their overnight stay.

At the end of the semester, community members visited campus to see final student design proposals. Students presented their design ideas and heard community partner feedback as well as feedback from other design professors, local designers, a proposal development officer, an associate dean of students, prospective students, arts extension, philanthropy office staff, staff from the office of innovation and strategic partnerships, among others. The presentations were an open gallery style to invite a diverse audience in an inclusive review style of final work. Students were encouraged to extend invitations to their other professors, peers, and family members, many of whom are from the region.

OUTCOMES:

After the semester concluded, the lead faculty presented the collective body of designs to community partners on site for feedback and future planning. At this meeting, the next steps were determined how to advance student designs to actionable outcomes that community partners could deploy. Of the six student projects presented, one was selected for implementation. A student from the selected project was hired to complete the necessary revisions for implementation. Additionally, the community desired revisions to several projects to be adapted to other sites for the downtown.

The partners who contributed to projects are an advisory group of four key members representing various constituents within the community, such as residents, artists, non-profits, and local elected officials. Many community members provided comments and thoughts to students while walking around town, visiting local businesses, and stopping at the downtown coffee shop. While these individual conversations were not documented directly, these comments and conversations informed the work.

The student work was actively critiqued by community members to reflect cultural appropriateness. Themes from this dialogue explored functionality, typology, and risks of flooding. The community partner feedback altered students' ideas by exploring how to make the businesses secure but not separate them and build symbiotic relationships with businesses. Student ideas that resonated with the collaborators were around ideas of creating parking and mixed-use facilities, incorporating pop up shops, spaces for youth to gather, and temporary housing, that would develop local ownership. Programmatically, feedback reinforced some student work to develop more housing due to the population increase and lack of housing inventory. Community partners responded to the work by explaining to the students how working in the flood plain would impact how designs would need to operate. Challenging their initial thinking about how water might permeate structures and materials, students shifted their ideas on construction practices and space planning.

CONCLUSIONS AND FUTURE DIRECTIONS

Design education has long aspired to provide students "real-world" experience and a sense of societal responsibility. By layering community development impacts on top of pedagogical outcomes, this project aspires to redefine the traditional expert-client power structure, elevating the value of local intellectual and social capital. Further, designing proactive climate resilience strategies that intersect with community & economic development outcomes counteract a narrative that commonly associates rural communities with risk.

Historically marginalized voices of coal impacted communities have often been sidelined with conversations related to climate change and the fate of the communities themselves by outside entities. However, as we seek to collectively address the complex and multigenerational challenges of social equity and climate

in a landscape marred by the physical and societal impacts of coal mining, design must consider the power dynamics against this backdrop. Our design initiative seeks to address these issues through sustained engagement and participatory design pedagogy, disrupting traditional engagement models that operate on a semester calendar. Ideally, this approach generates equitable and mutual benefit to students, faculty, and community.

Valuing the collective wisdom and diverse expertise within the communities we work, the aspiration is to transition disruption to normative practice, providing supportive design practices in an inclusive process for sustainable responses to the era of climate. To better integrate sustained engagement within the university, we seek to further refine our assessment strategy, leverage the land-grant mission of our university, and elevate design process in the disciplinary discourse.

Moving forward, the team intends to expand the program to other communities in the region. However, as the team expands to a regional approach, we remain committed to sustained engagement, providing longevity to the partnerships created, safeguarding against temporary engagements without impact, mitigating unintended harm and extractive practices from short-term investments. Key is continuing to develop redundant relationships between university personnel and community leaderships, hedging against a "single point of failure" in the social network.

Per Arnstein's model, the final step of community empowerment is delegation of authority by the experts. Sustained engagement requires an exit strategy as well, which we will be further developing in the coming two years. By building resilience through knowledge transfer and divesting control of resources, our mountain communities are better positioned to absorb climate impacts. By educating students in co-creative techniques, future professionals are prepared to address adaptive problems in a productive manner.

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