

Co-Production for Equitable Governance in Community Climate Adaptation: Neighborhood Resilience in Houston, Texas

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Abstract

As urban areas grapple with the pressing impacts of climate change, fostering community-level resilience becomes imperative. Co-production, emphasizing active stakeholder engagement, offers a pathway to robust, equitable, and inclusive adaptation strategies. This article delves into the co-production processes within neighborhood resilience planning in Houston, Texas, revealing how collaboration between communities, planners, and municipal leaders can address climate vulnerabilities and support disadvantaged groups. Through an empirical analysis of three Houston neighborhoods, the study evaluates co-production’s role in promoting neighborhood-scale adaptive capacity and reshaping power dynamics to advance equity and environmental justice. The results highlight the significance of local institutions and the necessity of municipal commitment to co-production efforts. The study contributes actionable insights on the application of co-production in neighborhood climate adaptation, emphasizing the need for direct municipal engagement to implement transformative spatial projects and rebalance governance frameworks for effective climate action.

Keywords

capacity building; climate adaptation; co-production; environmental justice; Houston; neighborhood resilience; urban governance

1. Introduction

1.1. Co-Production, Institutions, and Climate Adaptation

Urban centers confronting the urgent impacts of climate change must adopt robust, equitable, and inclusive strategies. Co-production has risen as a key approach for enhancing resilience and governance, especially at

the neighborhood level, by fostering collaboration among municipal leaders, communities, and planners to address vulnerabilities and support disadvantaged groups (Anguelovski et al., 2016; Huybrechts et al., 2017; Intergovernmental Panel on Climate Change, 2021; Shokry et al., 2023; Wolf & Mahaffey, 2016; Woodcraft et al., 2020). This study examines the role of co-production in climate adaptation initiatives at the neighborhood level in Houston, Texas. Given that urban design and institutional management of public spaces are crucial for community resilience, incorporating community resilience into socio-spatial design and management of public spaces, including utilities, is pivotal for creating sustainable urban futures that are guided by local knowledge (Kousky, 2021; Lotfata & Munenzon, 2022). Such insights can help develop strategies that reflect community knowledge, leading to transformative actions (Klenk et al., 2017; Sovacool et al., 2016; Swart et al., 2023; Woodcraft et al., 2020).

Co-production distinguishes itself from participatory planning by engaging stakeholders in managing and creating public services, following Ostrom's (1996) concept of active stakeholder engagement in the creation of public goods and services (see also Wyborn et al., 2019). It aims to include diverse perspectives, address power imbalances, and drive societal change (Turnhout et al., 2020). Yet, effective co-production faces challenges such as maintaining participant engagement and, critically, overcoming institutional barriers to transformative outcomes (Jagannathan et al., 2020). Co-production in neighborhood resilience and adaptation planning is about generating knowledge and engaging with power dynamics and political structures. This study investigates co-production's impact on community adaptive capacity and power dynamics, focusing on Houston's Neighborhood Resilience Planning (NRP). It assesses how the NRP promotes equity and environmental justice through institutional and capacity-building initiatives in climate adaptation (Mees et al., 2018; Turnhout et al., 2020).

1.2. Environmental Justice and Decision-Making

In pursuing community-focused, equitable climate adaptation, it is essential to comprehend the nuances of co-production and intersectional planning. This approach emphasizes the integration of local knowledge and the leverage of the power-holding institutions (Fitzgibbons & Mitchell, 2019; Kirkby et al., 2018; Lotfata & Munenzon, 2022; Murray & Poland, 2020; Poland et al., 2021). Participatory design and urban resilience are essential components of effective climate adaptation, which requires a deep understanding of the underlying power dynamics (Meerow et al., 2016).

Adopting an intersectional lens in participatory processes can lead to more inclusive collaborations, bridging the gap between traditional decision-makers and community members, thus empowering marginalized groups (Arnstein, 1969; Buckingham-Hatfield, 2000; Crenshaw, 2013; Oteros-Rozas et al., 2015; Ruiz-Mallén, 2020; Schlosberg, 2007). In this context, co-production emerges as a critical tool in addressing intersectional inequities and bolstering urban resilience (Eidt et al., 2020; Joshi & Moore, 2004). Yet, pre-existing inequalities often obstruct truly inclusive co-production. Redefining power dynamics is central to this effort, paving the way for more resilient urban communities (Bremer & Meisch, 2017; Jasanoff, 2004; Muñoz-Erickson et al., 2017; Ruiz-Mallén, 2020; Van Kerkhoff & Lebel, 2015; Wamsler, 2017). The six co-production modes proposed by Chambers et al. (2021) aim to empower marginalized voices by redistributing power, which is crucial for their active participation (Bixler et al., 2022; Wamsler, 2017).

Hardy et al. (2017) argue for a paradigm shift in climate change and sea-level rise science, advocating for an integrated approach where policy questions and scientific research reciprocally influence each other. This shift includes incorporating race-aware adaptation planning from the outset, acknowledging the historical conditions that have led to uneven racial development and vulnerability. Similarly, Jacobs (2019) emphasizes the need for a deeper focus on community knowledge and environmental practices in disaster planning to address systemic oppression. Advocates such as Hardy et al. (2017) and Jacobs (2019) call for a shift in climate science and planning to acknowledge historical inequities and integrate community-centric insights, enriching adaptation strategies with diverse perspectives. This study seeks to refine the application of co-production in urban adaptation, aiming to inform strategies that align with equity and sustainability, thereby serving as a guide for future resilient urban development.

1.3. Houston Case Study

Houston's approach to urban planning, marked by a lack of zoning and a tilt towards market-driven development, has led to significant environmental justice concerns (Qian, 2010). Post-Second-World-War expansion, driven by annexation policies, often sidelined equitable infrastructure in favor of commercial interests, resulting in disparate municipal service provision (Fisher, 1989; Gray, 2022). Communities of color have faced historical neglect and environmental risks, with responsibilities for maintenance frequently shifted onto already marginalized residents (Korver-Glenn et al., 2017; Schuetz & Kanik, 2023).

The 1990s saw the introduction of "super neighborhoods" to empower local decision-making. However, hampered by resource constraints and a lack of government support, these initiatives fell short, mirroring the broader trend of public service privatization (Vojnovic, 2003). This governance model often forces civic clubs and grassroots entities to shoulder the advocacy and implementation of local infrastructure projects (Fisher, 1989; Qian, 2011).

Hurricane Harvey's impact in 2017 laid bare the heightened vulnerabilities of minority communities situated in high-risk areas, calling attention to the urgent need for policy reforms to address deep-seated planning inequalities (Hendricks & Van Zandt, 2021). This article explores the NRP project within Houston's distinctive governance context, advocating co-production to address historical inequities and champion equitable climate adaptation. The study highlights the need to foster inclusive decision-making and dismantle systemic obstacles to cultivate resilient, equitable urban communities.

1.4. Study Goals

This research is dedicated to developing a framework for evaluating co-production processes in community climate adaptation across three neighborhoods in Houston, Texas, focusing on rebalancing power dynamics for equitable climate adaptation. The study investigates the effectiveness of co-production in NRP for fostering local capacity building and reshaping governance and power structures. The research employs empirical methods to analyze the NRP process's first year, particularly the dynamics between community members, the City, and consultancy teams. A comparative analysis across neighborhoods enhances understanding of co-production's role in resilience, revealing the diverse impacts of community dynamics and urban challenges on localized climate adaptation strategies. It aims to understand the interplay between spatial challenges, governance, decision-making, and the creation of robust community-based institutions.

Guided by frameworks from Bremer and Meisch (2017) and Chambers et al. (2021), this study seeks to understand co-production's role in building resilience capacity at the neighborhood scale.

2. Analytical Framework: Enhancing Capacity and Equity Through Co-Production

The study explores how neighborhood resilience plans can enhance capacity building, promote equity, and scrutinize interconnections between spatial challenges and decision-making. Utilizing Bremer and Meisch's (2017) normative lenses of public service, institutional, and empowerment, and Chambers et al. (2021) co-production modes, the framework critically assesses the co-production process, aiming to identify necessary shifts in the balance of power and agency. Additionally, it examines the role of institutions in fostering equity and environmental justice, recognizing the need for substantial funding, regulatory reform, and collaborative governance for successful urban resilience and climate-ready infrastructure (Huybrechts et al., 2017). This study aims to identify processes that promote power brokering and reframing by examining how co-production modes contribute to institution building.

2.1. Conceptual Grounding: Climate Risk, Environmental Justice, and Intersectional Planning

Effective climate adaptation demands equitable and intersectional planning that boosts adaptive capacity and confronts the deep-rooted injustices that influence societal dynamics (Bixler et al., 2022; Kirkby et al., 2018; Murray & Poland, 2020; Poland et al., 2021). These systemic inequities heighten climate vulnerabilities, making it imperative to incorporate social and demographic considerations into adaptation strategies (Hoffman et al., 2020). Hardy et al. (2017) argue that overlooking historical contexts in climate planning perpetuates environmental racism, adversely affecting marginalized groups. Conversely, acknowledging past injustices can lead to more resilient mitigation efforts. A shift towards climate justice is essential, advocating for race-aware adaptation that addresses power disparities and racial inequities from the outset (Lotfata & Munenzon, 2022; Ruiz-Mallén, 2020).

Co-production empowers communities to articulate their adaptation priorities and contribute their insights, challenging the limitations of conventional vulnerability assessments. Jacobs (2019) underscores the value of community-driven expertise in identifying challenges, critiquing the academic tendency to assign "social vulnerability" labels without authentic community interaction. Adaptation solutions must navigate the power dynamics that shape vulnerabilities to achieve environmental justice, ensuring inclusive decision-making processes (Arnstein, 1969; Schlosberg, 2007). This involves enhancing adaptive capacity through strategies ranging from land use modification and improved access to public services to strengthening community agency (Intergovernmental Panel on Climate Change, 2021). On a local level, this translates to fostering knowledge creation, amplifying underrepresented voices, and building trust to enable resource sharing and innovation (Pelling & High, 2005; Siders, 2019).

The neighborhood scale is identified as a critical site for reinforcing grassroots institutions. Chambers et al. (2021) highlight "reframing power" and "brokering power" as key modes for establishing new organizations and collective action. A comprehensive strategy to bolster adaptive capacities might involve urban design, capacity-building, and advocating for institutional and governance reform. This approach marries environmental improvements with community empowerment and equitable governance, including creating green spaces, modernizing infrastructure, and educational programs, all while supporting community

organizations. Nonetheless, broader institutional and governance reforms are necessary, including policies that ensure access to resources, transparent decision-making, and acknowledgment of intersectional challenges. Figure 1 depicts the relationship between co-production actions and stakeholders through institutional mechanisms.

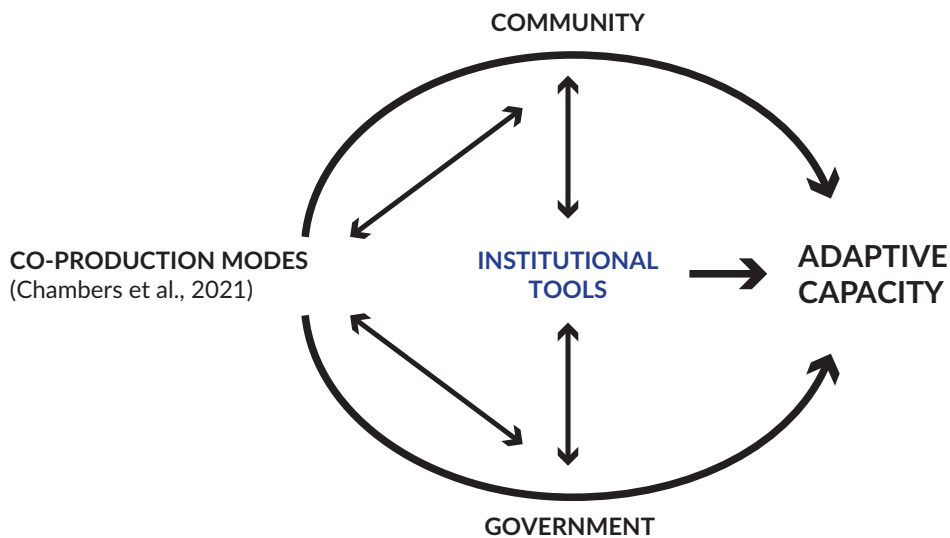


Figure 1. Framework for identifying co-production actions related to the relationships between capacity building and the community and governmental institutions.

2.2. Empowering Communities in Climate Adaptation: Co-Production, Power Dynamics, and Resilience Planning

For effective climate adaptation, resilience planning should facilitate participatory processes that promote genuine power-sharing and inclusivity in decision-making (Arnstein, 1969; Bixler et al., 2022; Fitzgibbons & Mitchell, 2019; Poland et al., 2021). An intersectional lens enriches the understanding of climate impacts and cultivates collaboration that challenges established power structures (Huybrechts et al., 2017; Teli et al., 2020; Turnhout et al., 2020). Hardy et al. (2017) call for a race-aware approach to planning that addresses racial disparities in vulnerability and development by incorporating historical insights. While immediate outcomes of co-production can be evident, achieving broader systemic change is often more complex, requiring steadfast engagement and the dismantling of institutional obstacles to enable meaningful policy transformation (Jagannathan et al., 2020). Examples from Durban (Wamsler, 2017) and London (Teli et al., 2020) illustrate the potential of inclusive strategies to empower communities and foster co-production.

Nonetheless, the transition from dialogue to transformative action can be hindered by systemic inertia. Studies from various ecosystems, such as the Great Barrier Reef, highlight the necessity for governance frameworks that incorporate diverse perspectives and avoid reinforcing existing inequalities (Jagannathan et al., 2020). Co-production tools such as the spectrum of community engagement to ownership help elevate community participation towards shared governance, fostering trust and accountability, as seen in the Providence Climate Justice Plan (City of Providence Office of Sustainability, 2019; see also Gonzalez, 2019). Likewise, the spectrum of community-led approaches encourages community empowerment through capacity building and relational investment, promoting democratic governance reforms (Attygalle, 2020).

Co-production is a dynamic process that, when applied thoughtfully within political and governance contexts, can lead to equitable and sustainable climate resilience outcomes underpinned by empowered communities and responsive institutions.

Figure 2 presents a model for enhancing engagement through various community-centric approaches—owned, driven, shaped, and informed—each differentiated by its degree of co-production, governance style, resource allocation, and methodologies employed. This model incorporates frameworks such as Gonzalez’s (2019) spectrum of community engagement to ownership and Attygalle’s (2020) spectrum of community-led approaches. These frameworks emphasize the significance of co-creative processes, the reinforcement of institutional resilience, and the integration of communities’ experiences and expertise in shaping policy, thus promoting sustainable and equitable outcomes. The model excludes the “community-informed” approach, which involves consultation to adapt initiatives to local needs. This approach was not included as it aligns more with top-down governance models, which do not fit the participatory and egalitarian principles conveyed in the diagram.






RESOURCES			
POWER			
PATHWAY	<p>COMMUNITY-SHAPED</p> <p>Ensures that community needs and assets are intricately woven into the planning process</p>	<p>COMMUNITY-DRIVEN</p> <p>Combined resources between the municipality and the community, empowering communities to take on leadership roles in implementing these changes</p>	<p>COMMUNITY-OWNED</p> <p>The community will have the power to make decisions while the city provides a blueprint for change, led by the residents</p>
CO-PRODUCTION METHODS	<p>RESEARCHING SOLUTIONS, EMPOWERING VOICES, BROKERING POWER</p> <p>Collaborative search for solutions and empowerment in the participation process with capacity building, no shared distribution of resources</p>	<p>EMPOWERING VOICES, BROKERING POWER, REFRAMING POWER, NAVIGATING DIFFERENCES, REFRAMING AGENCY</p> <p>Promote collaboration and leadership by providing fair access to opportunities and resources; build strong networks with municipal support</p>	<p>BROKERING POWER, REFRAMING POWER</p> <p>The community leads the process through reframing power and institution building</p>

Figure 2. Pathways of community participation and co-production modes and methods. Notes: Community is indicated in blue and municipal government in black; the square symbol designates resources and the round symbol power.

Spatial actions require community-based institutional support, involving “navigating differences” and “reframing agency” modes (Chambers et al., 2021) and addressing spatial and historical inequities. Genuine government commitment is vital for equitable access and influence and is affected by higher-level institutional actions (Huybrechts et al., 2017). Neighborhood-level strategies require organizational development and knowledge about implementation and policy, employing “brokerage power” and “reframing power” modes to transform governance through co-production.

2.3. Institutional and Political Capacities for Equity and Environmental Justice

Navigating the complexities of community and political landscapes for co-production requires skillful negotiation and the creation of frameworks that support collaborative governance (Huybrechts et al., 2017). The efficacy of co-production lies in its ability to foster grassroots participation, adapt to shifting policies, and undertake strategic institutional actions. Building local capacity is crucial to incorporating community perspectives within decision-making processes and tackling systemic inequities (Akerlof et al., 2023; Jagannathan et al., 2020).

Innovative governance models, participatory grant-making, and peer networks are instrumental in aligning organizational governance with community aspirations and enhancing transformative potential (Lodato & DiSalvo, 2018). Collaboration between municipal actors and community-based organizations is essential for equity planning and environmental justice, as they are critical in directing local investment and fostering community-led initiatives (Figure 2). Co-production propels institutional change and improves societal involvement and understanding (Huybrechts et al., 2017). Furthermore, co-production acts as a conduit for critique and political evolution and is capable of utilizing and reshaping existing institutional structures to challenge entrenched norms. “Commoning,” proposed by Teli et al. (2020), emphasizes grassroots economic models and community engagement, catalyzing change and power redistribution. For successful climate adaptation, it is imperative to connect community-based organizations to essential resources, enabling them to actively participate in city planning and advocacy, thus ensuring that local voices guide relevant actions.

The diagram in Figure 3 displays a pathway of gradual change that combines different scales of community, government, and non-profit institutions. The steps to achieve this combination are knowledge production, relationship building, accessing resources, and adjusting power dynamics. The diagram outlines the process, its tools, and micro-institution creation. It shows links between the government and the community working to

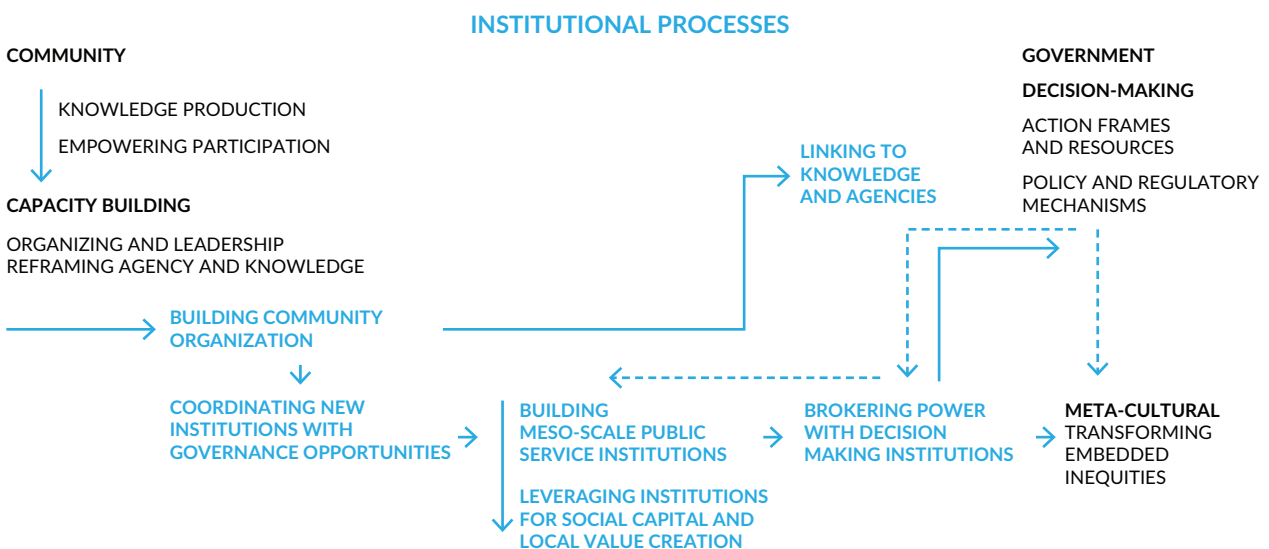


Figure 3. The role institution building process in advancing adaptive capacity and potential power shift. Focusing on brokering and reframing power between micro-communities and macro-governments by scaling up institutions and actions to enable co-production.

advance the process. The process begins with engaging community leaders and connecting them with agencies and professionals, allowing them to access professional knowledge and improving transparency in government decision-making. The co-production process also permits the creation of organizations that mitigate gaps in public services, such as neighborhood patrols or a local green infrastructure maintenance workforce. A critical aspect of this process is addressing “meta-cultural frames” (Huybrechts et al., 2017). These frames refer to the wider cultural and social norms and values that influence institutional policies and practices. Adaptation planning can challenge the existing power relations and promote social justice by creating inclusive spaces where marginalized groups can voice their concerns and participate in decision-making that directly affects their lives. By adopting this approach, the objective of a power shift is not just a theoretical concept, but it becomes a practical strategy for cultivating equitable climate adaptation and resilience.

3. Methods

3.1. Overview of the Case Study

This study explores the development of the Houston NRP project, aimed at crafting community-centric climate adaptation strategies (City of Houston’s Planning and Development Department, 2023). As part of Mayor Turner’s resilience plan following Hurricane Harvey, the project initiated a pilot in Independence Heights, East Houston, and Edgebrook to develop a replicable framework (City of Houston, 2020). In 2022, the NRP was funded by a Community Development Block Grant, facilitating collaboration between the City of Houston’s Planning and Development Department, the Mayor’s Office of Resilience and Sustainability (City of Houston’s Planning and Development Department, 2023), and a multidisciplinary consultant team. Spearheaded by One Architecture and Urbanism, Community Lattice, and the Black United Fund of Texas facilitating community co-production, the team undertook this process from January 2022 to April 2023, focusing on resilience and climate adaptation planning, underpinned by vulnerability analysis and strategic planning.

The three Houston neighborhoods targeted by the NRP pilot were chosen for their heightened vulnerability to flooding and historical challenges with disaster recovery (City of Houston’s Planning and Development Department, 2023). Selection criteria were established by the Mayor’s Office and the Planning and Development Department. These criteria were based on data that indicated repetitive loss from floods, communities that housed vulnerable populations, and those that had experienced hindered post-disaster recovery due to ineffective assistance (Griego et al., 2020). The NRP underscores capacity building to empower communities through education and outreach, enabling them to navigate recovery, comprehend individual risks, and interact effectively with local government. Building support from various sectors, including city, non-profit, and philanthropic entities, is crucial for the success of community-based initiatives (City of Houston’s Planning and Development Department, 2023).

The NRP’s methodology, framed by the City of Houston’s Planning and Development Department and its consultant team, utilized the municipal super neighborhood (SN) boundary to define each neighborhood’s geographical expanse. SN offered communities access to a suite of resources, services, and decision-making mechanisms as a governance tool, bringing together residents, property owners, businesses, faith groups, and others intimately tied to the locality (Vojnovic, 2003). For this project, each community established a neighborhood support team (NST) conceptualized by the Planning and Development Department. This team of community ambassadors and multi-sector representatives was pivotal in

formulating neighborhood-tailored resilience plans, liaising with city officials, and broader outreach. A Technical Advisory Committee, consisting of professionals from various sectors, including city agencies, philanthropies, businesses, and other experts, lent their expertise to inform and support potential strategies, ensuring a holistic and coordinated approach to resilience planning (see Figure 4 for the project stakeholders). While this process follows traditional resilience planning efforts, the main goal of focusing on co-production was capacity building, aimed at bolstering social resilience and adaptive capacity, with the intention of bridging the gaps resulting from a history of disinvestment and the City's laissez-faire philosophy (Fisher, 1989; Qian, 2011; Vojnovic, 2003). Community capacity building, an essential aspect of this endeavor, involves leveraging existing resources and creating new ones to deepen community capacities for resilience strategies.

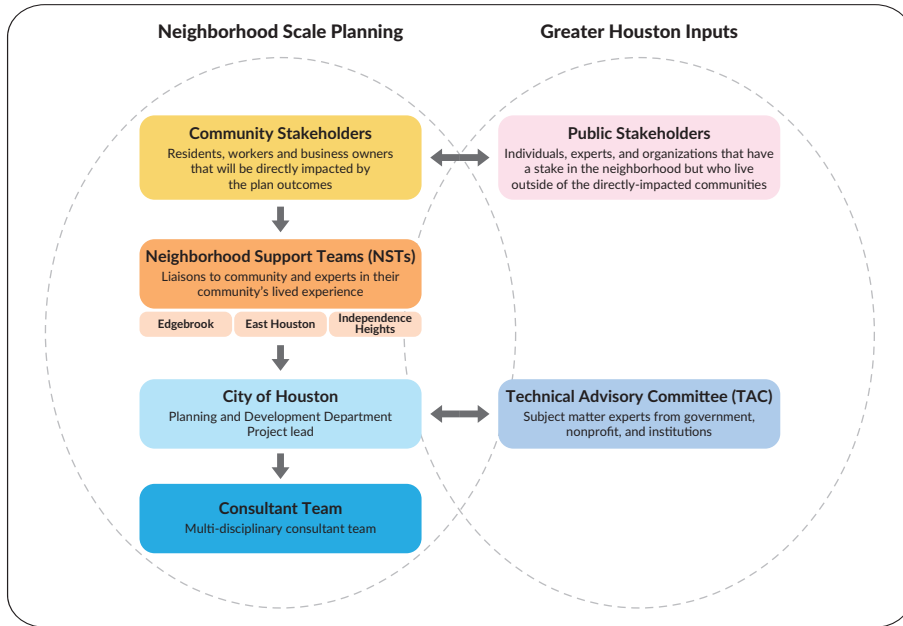
To initiate the planning process (in 2022–2023), the City, in collaboration with the consultant team, designed a Community Participation Plan. To form the NST, the community liaisons engaged various stakeholders: SN representatives, faith leaders, civic clubs, community development entities, local activists, nonprofits, and other interested residents. Across 12 months, NST members attended four co-production and three public meetings, disseminated city surveys to their respective communities, and invited representatives from the Planning and Development Department and the consulting team to their community events:

- East Houston conducted four NST meetings (two virtual), hosted four public meetings (one virtual), ran six interactive NST member workshops (meet people where they are at various events), and organized three outreach events as extensions of other community programs;
- Independence Heights held all four NST meetings virtually, four public meetings (with one virtual), six NST member workshops, and three community program-driven outreach events;
- Edgebrook executed four virtual NST meetings, four public meetings (one virtual), four NST member workshops, and six outreach initiatives, which included two door-knocking campaigns for awareness and four integrated SN activities;
- The NST meetings, Technical Advisory Committee workshops, and public meetings were scheduled for two hours.

The NSTs consisted of community leaders and sector representatives, each reflecting its neighborhood's unique characteristics and needs. Edgebrook's NST, comprised of six residents, focused on enhancing understanding of flood risks and local governance, highlighting a collective ambition for stronger political representation and improved city services. East Houston's NST, with five members representing a mix of community organizations, faced challenges in attracting city investment and a deep-seated skepticism that the City would fulfill its promises. Independence Heights' NST, comprising five members from varied leadership roles, grappled with gentrification and preservation concerns, expressing a need for genuine city support in their resilience efforts. Independence Heights, having a legacy as Texas's first African-American municipality in 1915, is anchored by powerful grassroots entities (Pruitt, 2005). NST members expressed concerns about historical neglect, the pressing need for long-term resilience planning, and a desire for authentic engagement from the City.

During the initial series of NST meetings, participants included representatives from the Planning and Development Department, the consulting team, an observer researcher, and selected NST members. As stated by the consultant facilitator, the primary objective was to comprehend the community's ongoing

a The NRP process and participants from the NRP final guidel by City of Houston.



b Process sequence and timeline from the NRP raplicable framework by City of Houston.

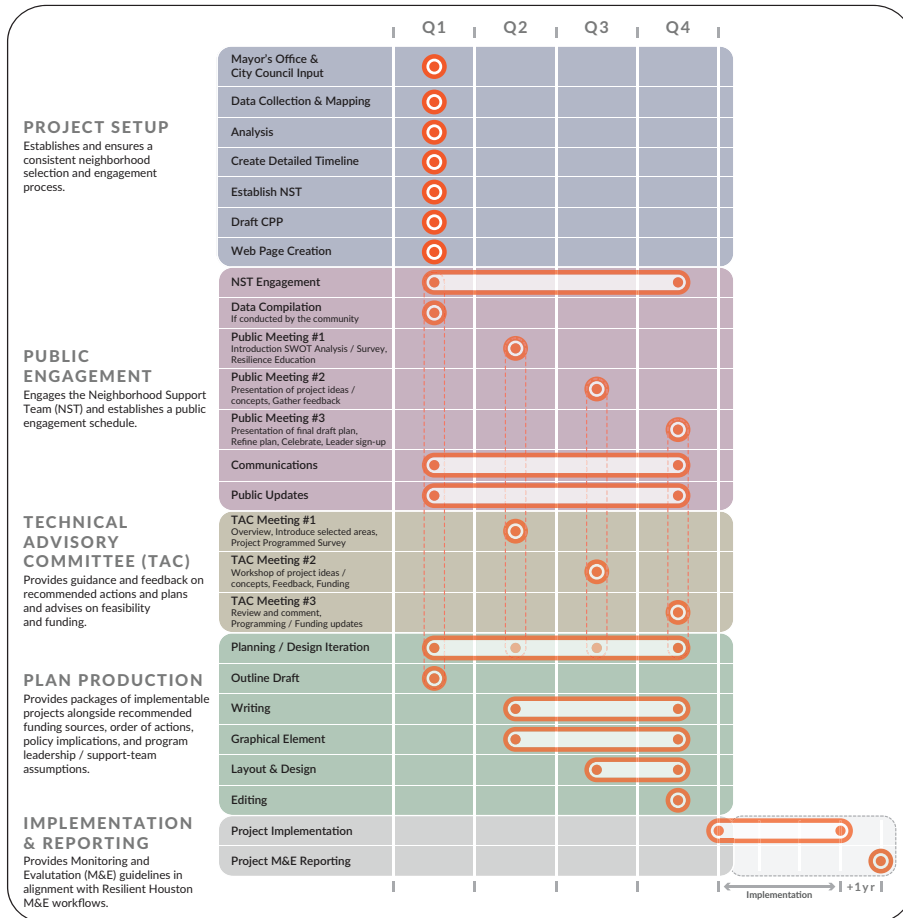


Figure 4. NRP process and timeline based on groups of stakeholders and participants in the co-production process.

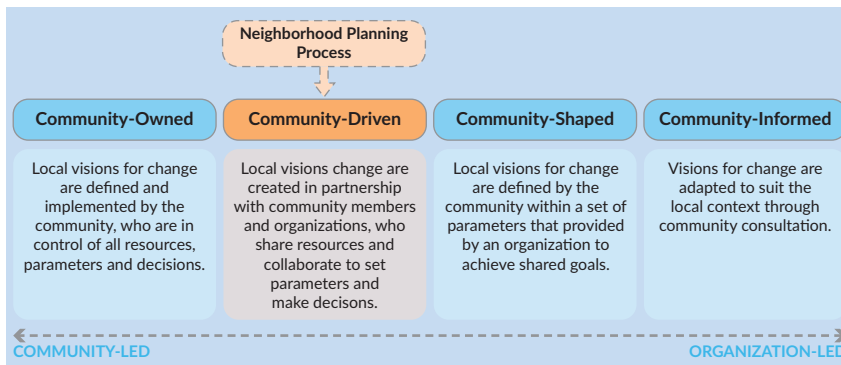
efforts to bolster their neighborhood's adaptive capacity, discern their priorities, and cultivate trust. The subsequent meetings emphasized validating data assembled by the consulting team, concentrating on prior unsuccessful planning endeavors and a risk vulnerability assessment. Typically, vulnerability assessments employ pre-existing data sources, such as census demographics and social vulnerability indices (Jurgilevich et al., 2017). Through these early workshops, community stakeholders and NST members cross-referenced and validated this data, accentuating the significance of community-centric knowledge creation in discerning neighborhood vulnerabilities (Hendricks et al., 2018). A post-Hurricane Harvey recovery group member pointed out notable limitations in the accessible spatial and socio-economic data, particularly concerning certain overlooked disinvestment challenges. This challenge becomes significant when dealing with recurring flooding issues, highlighting the need for comprehensive community-led knowledge production (Mohtat & Khirfan, 2021).

Furthermore, during the first series of NST meetings, a listening session was dedicated to discussing the goals of the plan and the priorities that each neighborhood deems essential to their resilience and ability to adapt. The City and expert team presented the NST groups with the following goals: (a) integrating city-wide initiatives and funding at the local level, (b) implementing projects that have the most significant resilience benefits for neighborhoods, (c) identifying funding sources that communities can access directly, and (d) promoting community cohesion. Emphasis was placed on systemic challenges prevalent in the neighborhood, as these are fundamental to building resilience beyond addressing immediate flood risks.

The process of co-production with the NST representatives and other community stakeholders was presented by the Planning and Development Department and consultant team. As framed by the team, the four phases of the planning process started with the vulnerability assessment, current and past planning initiatives, and identifying which needs were prioritized. This was followed by visioning sessions and brainstorming strategies to address the identified spatial and operational issues. The third phase aims to frame place-based and project-based investments across three stages: short-term initiatives for immediate implementation, near-term projects achievable in a few years, and long-term projects that require substantial coordination, funding, and construction, all based on the vision and priorities set by the community.

The initial phase of Houston's NRP centered on aligning with the community-driven pathway outlined by Attygalle (2020), promoting sustained collaboration, strategy development, and joint decision-making (Figures 2 and 5A). The City's proactive engagement with various agencies and City Council members aimed to directly address community concerns, exemplified by Independence Heights' inquiries about 311 call center operations and Edgebrook's calls for an increased police presence. These discussions enabled mutual learning and empowered community leaders with strategic planning knowledge, fostering a comprehensive understanding of municipal programs for grant applications and resource access. Based on NST member conversations, it has been observed that some individuals or groups were not being included in certain decision-making processes despite their desire to participate. For example, when the tax increment reinvestment zone was established in East Houston, many attendees advocating for the initiative were left out of the final board. NST members expressed a desire for the City to play a strategic role in building partnerships between organizations and linking to regional agencies. They also expected that the City would be an active and responsive partner.

a The Attygale community participation spectrum and the adopted pathway from the NRP final guidel by City of Houston p. 9.



b Guiding principles for the plan strategies according to phases and complexity from the NRP final report by City of Houston p. 42.

GUIDING PRINCIPLES		
LIVING IN A CONNECTED COMMUNITY SAFE AT HOME SAFE IN THE NEIGHBORHOOD		
SHORT-TERM	NEAR-TERM	LONG-TERM
<p>QUICK WINS link community needs, funding opportunities, energy with City or not-for-profit and philanthropy</p> <p>EXECUTE NOW...or really soon</p>	<p>PLACED-BASED INTERVENTIONS realize multiple concepts, and have multiple benefits</p> <p>COLLABORATE across City agencies + place in Capital Improvements Plan</p> <p>DESIGN + ENGINEER PROJECT with community input</p> <p>EXECUTE in approximately 3-5 years</p>	<p>PLACED-BASED INTERVENTIONS to catalyze transformation across multiple stakeholder groups</p> <p>IDENTIFY project leader + supporting actors</p> <p>VISION DOCUMENT to use to secure State, Federal + private and/or philanthropic funding</p> <p>DESIGN + ENGINEER project components after (partial funding is secured, and get input from the community</p> <p>EXECUTE in phases</p>

c Open drainage ditches from East Houston, NRP Final report by City of Houston.



Figure 5. Images from the final NRP report for East Houston as shared on the website Let's Talk Houston: (a) The team's stated goal for the project is to achieve capacity building through the community-driven pathway and build partnerships with the government for decision-making and resource sharing, as shown in Figure 2; (b) phasing of projects and interventions based on project complexity and implementation time; (c) open drainage ditches are common across city neighborhoods and maintenance is critical to their effectiveness.

However, jurisdiction and responsibility have been a source of conflict between local and regional agencies. Historically, marginalized communities lacked essential city utilities. When drainage was introduced, the City chose cost-effective methods that burdened residents with maintenance. This neglect and shifted responsibility exacerbated drainage issues in these areas over time (Schuetz & Kanik, 2023).

In this longitudinal qualitative case study on Houston's resilience planning, the research primarily focuses on how these initiatives enhance community capacity, strategic efficacy, and equitable progress. The study probes into the interdependencies of spatial challenges, governance, decision-making, and the potential of established systems to develop robust, community-led institutions to rectify power disparities and foster adaptive capacity.

This manuscript analyzes the first year of the NRP process and the pilot project data from 2022–2023 in three neighborhoods. The study examines the planning process, including the strategies, resources, leadership, and institutions required for implementation. The researcher was embedded with the consultant team and analyzed which concepts succeeded in the final document and why. This qualitative case study provides continuous observation, offering insight into co-production and planning. Embedded research is a collaborative approach to urban planning that merges academic research with field practice. This synergy ensures that theoretical knowledge aligns with real-world applications (Odongo & Ma, 2021; Parnell & Pieterse, 2016). The research analyzed unstructured participatory observations from in-person and virtual meetings, which were recorded and summarized through meeting minutes. Formal materials, draft proposals, comments, and final documents were also reviewed.

3.2. Data Collection and Analysis

The study's data analysis primarily relied on an empirical and observational approach to determine how co-production mechanisms impact power dynamics and aid community capacity building in Houston's NRP. The research focused on closely observing and analyzing the resilience project's practical co-production and development phases to identify the facilitators and barriers to the co-production process. The goal was to uncover the governance frameworks required for successful implementation (Burns, 2014; Hensel & Nilsson, 2016). Data was collected through active participation in and observation of in-person and virtual meetings, including NST meetings, Technical Advisory Committee workshops, and public meetings. This comprehensive data collection process involved reviewing meeting minutes, recorded sessions, surveys, and project reports, all contributing to a nuanced understanding of the community–government dynamics within the resilience planning process (Baxter & Jack, 2008; Birch, 2012; Yin, 2014).

The NST meetings were the primary data source for the analysis of the co-production process and capacity building in the observational exploratory case study. Actions and priorities from these meetings were categorized into three normative lenses: public service, institutional, and empowerment (Bremer & Meisch, 2017). In this study, knowledge co-production principles are the underlying philosophies, values, and normative frameworks that guide the process across societal levels. This analytical method provides a detailed understanding of the collaborative generation of knowledge, its participants, and the resultant impacts. It highlights the importance of shared governance and the reallocation of power. The full participation of diverse stakeholders in co-production activities is encouraged. The actions were then compared to the modes of co-production identified by Chambers et al. (2021), allowing an evaluation of the

dynamics of agency and power. This assessment is crucial for monitoring the project's progress. The initial categorization in Table 1 aims to identify which actions and strategies signal a need for—or result from—a shift in the balance of power, resources, and agency, as evidenced by the City's commitment. Further analysis segmented these actions according to the institutional scales defined by Huybrechts et al. (2017), shedding light on the supporting institutions behind each action and the necessary reallocations of resources and power discerned from the discussions and the final report of the project. This categorized data enriches our comprehension of how co-production can recalibrate power dynamics, a concept visualized in Figure 3.

4. Results

4.1. Co-Production of Climate Adaptation-Focused Actions

This thematic analysis delves into the co-production of resilience strategies, underscoring the imperative to align public services with community-defined visions for resilience and adaptive capacity. It calls for a decisive commitment from Houston's leadership to advance beyond the City's traditional developer-centric planning and for active engagement with local resource allocation and power dynamics to cultivate solid and responsive institutions (Fisher, 1989; Jagannathan et al., 2020; Qian, 2011; Vojnovic, 2003). Utilizing the lenses of institutional structure, public service, and empowerment defined by Bremer and Meisch (2017), we categorize challenges and plot solutions, advocating for transparent public investments and the mobilization of local actors to shape their public spaces. This approach is predicated on fostering synergistic dialogue among city officials, consultants, and NSTs to ensure that initiatives align with community aspirations and contribute to a conducive shift in the power dynamics toward enhanced resilience.

In East Houston, the NST spotlighted salient concerns in the aftermath of Hurricane Harvey, such as escalating flood risks, a shortage in public service capacity, and a dire need for infrastructural renewal to bolster community resources and commercial viability (George, 2017). City officials have suggested participatory planning measures to enable residents to directly influence their neighborhood's growth trajectory. Simultaneously, Edgebrook's NST intends to amplify its community's capacity to navigate post-disaster recovery, with a keen focus on risk literacy and empowered local governance advocacy. Independence Heights, grappling with housing security and neighborhood character preservation, faces challenges from gentrification development and bureaucratic delays in planning controls. The prevalent development trend of subdividing lots for new townhomes leads to displacement and loss of historic significance (Fox, 2000). The community's efforts are geared toward establishing conservation districts to protect cultural assets, with the City showing intent to support these initiatives and to develop affordable housing solutions (Zuvanich, 2023).

The maintenance of stormwater drainage ditches was central to the discussions across neighborhoods, recognized as a linchpin for flood prevention but plagued by neglect. The burden of their upkeep has been shifted onto residents (Blackburn & Bedient, 2018; Rackleff, 2015). Efforts to fortify the communication channels between NST members and city representatives have led to more transparent maintenance protocols and reduced illegal dumping incidents.

The NST meetings underscored the importance of uniting community members and organizational leaders around a shared vision for neighborhood resilience. Conflicts arose where new organizations established

post-Hurricane Harvey were seen to receive preferential resource allocation over existing groups. The consultant team focused on guiding NST discussions towards actionable and resilient neighborhood strategies, emphasizing “navigating differences” to prepare for effective co-production and capacity building within each community.

The synthesized Table 1 from these discussions draws on the analytical models from Figures 1 and 2, distilling the essence of NST dialogues into a focused examination of action-oriented priorities. It scrutinizes the power dynamics and the allocation of resources between the communities and governmental entities while explicitly excluding the broader relational lenses of “researching solutions” and “navigating differences” by Chambers et al. (2021). This targeted assessment illuminates the actionable strategies with the potential to recalibrate the community’s power structures and resource access, reflecting the City’s level of commitment and providing a roadmap for future engagement and policymaking.

City-recommended actions in NST forums, such as establishing SNs and management districts and enacting local ordinances, align with the existing governance framework. Although these initiatives facilitate community interaction with public services and planning tools, they may not fully embody the community-driven pathway’s ethos of equitable decision-making and resource sharing. Responses offered by city officials often uphold conventional governance, missing the substantial, equity-driven change that Chambers et al. (2021) term “empowering voices.”

There’s a noticeable gap between the City’s professed support for community-guided planning and actual policy shifts that would alter power structures. Present co-production and capacity-building endeavors are predominantly dialogical, without evolving into significant policy reforms (“reframing agency”). This stalls the potential for partnerships to recalibrate power and bolster community institutions. The City’s hesitance to move away from deep-seated power dynamics and bureaucratic routines continues to hamper co-innovative and institutional advancements. This status quo challenges the need to critically reexamine Houston’s approach to co-production. Adopting strategies that genuinely redistribute power and empower communities is paramount for achieving lasting urban resilience and aligning with the objectives of the community-driven pathway (Attygalle, 2020).

4.2. Proposed Strategies and Scales of Co-Produced Institutions

The NRP strategically intertwines capacity building with existing urban planning and policy frameworks. The NRP’s approach, resonating with the insights of Huybrechts et al. (2017), positions grassroots micro-organizations as pivotal in shaping and influencing broader institutional and policy landscapes. Figure 3 in the study illustrates how proposed actions across different scales are linked to governing bodies, constructing a nuanced fabric of public service and management structures that enhance social capital and empower communities to negotiate power with larger institutions.

In the short term, the NRP prioritizes visible actions that directly impact social resilience. One example is a city-grant-funded electrical box mural project led by a local artist, advocated by the NST, and catalyzing cultural investment. Concurrently, the City’s Department of Neighborhoods amplifies this effect by providing essential support for capacity-building initiatives aimed at emergency response. This synergy underscores the active engagement between NST and city agencies such as 311 and Public Works,

Table 1. Categorization of actions and strategies indicating shifts in power, resources, and agency, reflective of city commitment based on NST meeting discussions.

Normative lens (Bremer & Meisch, 2017)	Co-production modes (Chambers et al., 2021)	Discussed challenges and actions	Existing power and resource distributions	Process and discussion
Institutional	Brokering power, reframing power	<p>Community inquiries focused on enhancing their understanding of municipal policies and accessing City resources</p> <p>Discussions emphasized fostering community participation in leadership roles and educating residents on effective advocacy and risk management</p> <p>NST meetings served as collaborative platforms, uniting diverse groups to focus on shared neighborhood goals and addressing conflicts stemming from competition over resources</p>	In the absence of strong local leadership, the power and resources are all with the City and agencies	Workshops linked community members to essential tools and municipal resources, bolstering efforts in organization and outreach; the potential political power of solid community organizations was emphasized as some of these groups revised their relationships with the City and other organizations
		<p>NST discussions underscored the necessity for collaborative partnerships across private, public, and regional entities to advance neighborhood projects and policies effectively, with the City's facilitation being a key component</p> <p>Capital improvement projects are driven by urgency and political will; community members will need to establish political partnerships to promote interests and access to funding</p> <p>A range of planning incentives exist, including tax revenue mechanisms, yet a gap in community awareness persists on how to leverage these tools for local benefit</p>	Underutilized community leadership mechanisms and available resources, the power can be balanced	The City and team provided the resources to understand these mechanisms and committed to promoting capital improvement projects and planning initiatives on their end

Table 1. (Cont.) Categorization of actions and strategies indicating shifts in power, resources, and agency, reflective of city commitment based on NST meeting discussions.

Normative lens (Bremer & Meisch, 2017)	Co-production modes (Chambers et al., 2021)	Discussed challenges and actions	Existing power and resource distributions	Process and discussion
Public service	Reframing power, reframing agency	Concerns about inadequate police enforcement of ordinances, particularly regarding illegal trash disposal, were recurring in meetings	The resources and decisions are with the governmental agency	Efforts were made to enhance dialogue between community patrols and police representatives; the initiative included developing educational materials for residents and providing conflict resolution and legal support to neighborhood patrols
		<p>Civic clubs initiated dialogue with the police department to boost local enforcement presence</p> <p>Community patrols sought expedited City responses and official support to enhance local safety measures</p> <p>Disputes within neighborhood patrols surfaced, highlighting a need for clearer City guidelines and support</p>		
		<p>Community members reported challenges with the 311 call center’s responsiveness to infrastructure issues, with requests often closed without resolution</p> <p>The maintenance of drainage ditches, reliant on 311, faced neglect, exacerbated due to jurisdictional discrepancies between local and regional authorities</p>	The resources and decisions are with the governmental agency	The process facilitated dialogue between NST, the community, and 311 staff, with staff attending various meetings and open houses to clarify system operations and priority-setting for service responses
Empowerment	Empowering voices	<p>NST members emphasized the vital role of local knowledge and historical context in shaping neighborhood resilience and heritage</p> <p>Strategies were discussed for preserving properties and practices and restoring historic urban patterns using existing planning mechanisms.</p>	The power is with the agency but can be shared through political activism and organization	Power-sharing relies on available mechanisms that allocate local decision-making to neighborhood leadership; however, it is controlled by the City and City Council

promoting regular infrastructure maintenance and advocating against illegal dumping. Advocacy efforts, such as a campaign for better maintenance of drainage ditches, highlighted the community’s capacity to initiate, change, and secure commitments from the City (McGuinness, 2023). In the medium term, the NRP tackles infrastructural resilience, with the NST facilitating dialogue to expedite stormwater system improvements in collaboration with the Harris County Flood Control District. The NST’s partnership with Trees for Houston illustrates the impact of cooperative, cross-agency initiatives that contribute to environmental stewardship and community engagement. Long-term projects within the NRP involve substantial, transformative interventions that require a broad spectrum of stakeholder engagement. The NST’s instrumental role in ensuring that community voices are heard and actively shaping these initiatives is captured in Figure 5 (City of Houston’s Planning and Development Department, 2023).

Representatives and community members from three neighborhoods worked together to establish priorities and visions and to assign responsibilities for roles and projects to drive implementation strategies. However, the process required trust and commitment from the municipality to ensure the community perceived the project as feasible. Thus, the municipality and the community had to work together to champion implementable projects. Each community had a different starting point regarding the strength of local institutions, knowledge of city planning mechanisms, and links to city officials. The co-production process required the establishment of requisite community organizations, as depicted in Figure 6. This nascent process highlights a considerable path toward implementation and transformative adaptive capacity that seeks to recalibrate power through governance frameworks. Although preliminary, this perspective illuminates the early stages of creating transdisciplinary links and co-owned public service institutions. The comparison of the three shows the limits of the co-production process for each NST workshop. While these workshops focused on community priorities and engaging a wider political context in proposing strategies and linked institutions, they still fell short of achieving a power shift (Jagannathan et al., 2020).

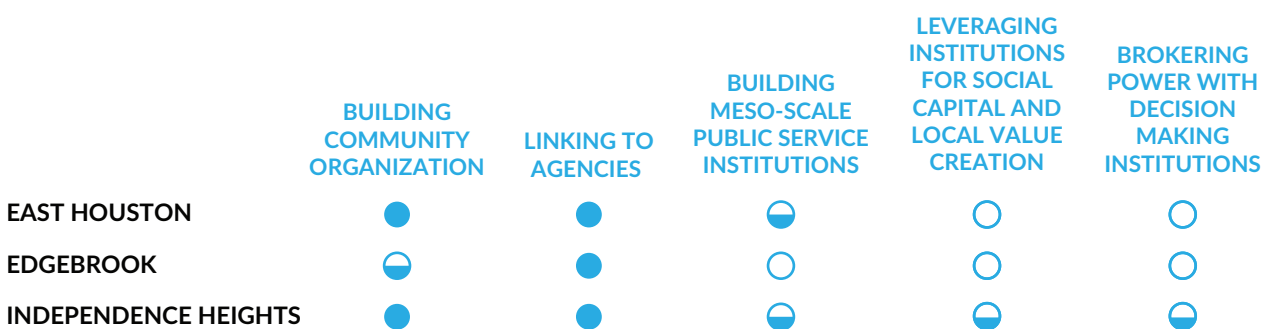


Figure 6. Institution-building progress resulting in the NRP co-production process. Note: A filled circle indicates an achieved goal and a half-full circle indicates a partially accomplished goal.

Addressing power imbalances and fostering inclusivity is crucial for co-production success in equitable climate adaptation (Bremer & Meisch, 2017; Chambers et al., 2021). However, an “implementation gap” persists at the municipal level (Wamsler, 2017), indicating a need for improved integration of transdisciplinary approaches into climate strategies. Enhanced by expert and policy support, ground-up institution-building can deepen participation and strengthen adaptive bases (Bixler et al., 2022; Huybrechts et al., 2017).

While current city initiatives establish a base for community involvement and empowerment, they mark only the beginning of a necessary shift toward democratic and resilient urban governance. Figure 7 encapsulates

this evolution, showcasing the roles of both nascent and established micro-institutions in spatial strategy development. It reveals the organizational entities, resource access shortfalls, and gaps in political engagement. At the outset, efforts concentrate on building trust and administrative efficacy. Subsequent phases create a cooperative policy framework that promotes adaptability and values at the local level. Looking ahead, strategies seek to utilize insights from micro-institutions within an overarching funding and planning model, aiming for community-centric change. However, many strategies remain reliant on existing public services, thus failing to substantially alter the landscape of authority and decision-making. To truly foster community resilience and reduce disparities, the City’s administration and consulting teams must continually evaluate and refine their approach. Implementing sustainable resilience measures that transcend mere consultation and deliver tangible, community-aligned solutions is critical.

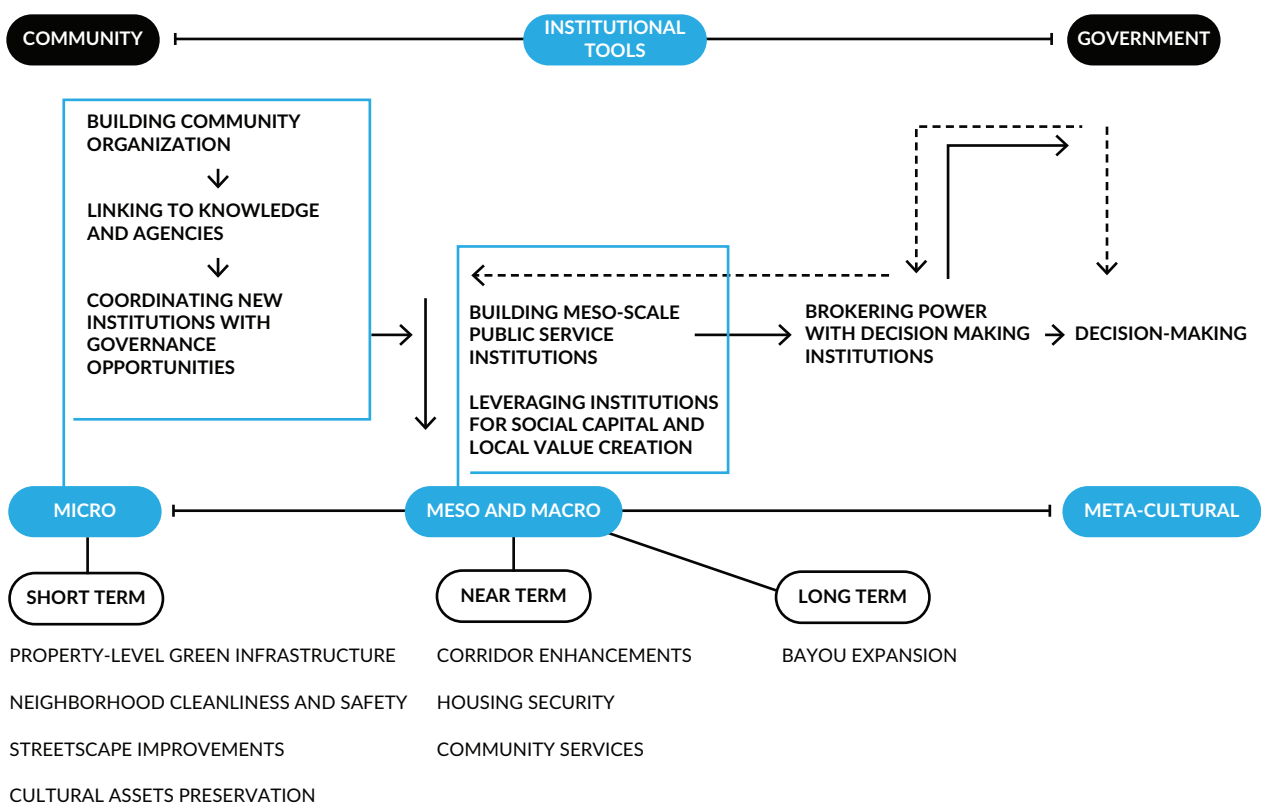


Figure 7. The institutions and the proposed actions as developed through the NRP process. As discussed in the NRP planning process and developed with NST members, actions are classified based on the institutional scale and how they connect to the analytical framework, as set out in Figure 3.

5. Discussion and Conclusion

Ostrom’s (1996) work on collective governance provides a theoretical backdrop for examining the NRP process, underscoring the critical role of active community involvement in managing public services and shared resources. The NRP, anchored in the normative lenses of empowerment, public service, and institutional structures as delineated by Bremer et al. (2017), has fostered community institutions and adaptive spatial strategies across three distinct neighborhoods. This collaborative framework has laid the groundwork for actionable resilience strategies, emphasizing empowerment and resonating with Akerlof et al. (2023) regarding the importance of community expertise and rights in participatory co-production.

The comparative approach of this study has sharpened the understanding of co-production by outlining specific mechanisms, practices, and tools that contribute to community climate adaptation across these neighborhoods. It has contextualized the unique challenges and opportunities within each locality, offering a detailed perspective on how co-production can either support or impede the critical rebalancing of power dynamics necessary for effective climate adaptation measures. By contrasting the experiences of the three neighborhoods, the study highlights the transformative potential of co-production in achieving social integration and equitable climate action. This approach is supported by the necessity of robust organizational networks for initiating co-production and fostering equitable governance, as asserted by Chambers et al. (2021).

NST dialogues have emphasized the importance of providing local groups with strategic development resources, building collective action capacities, and fostering trust with local agencies. This approach aligns with Ostrom's philosophy of inclusive management and marks a shift from development-centric urban planning to community-driven resilience efforts. The efficacy of co-production is contingent upon these strong organizational networks, which have been effectively utilized in Houston to advance local adaptation projects and institutional building through the NRP.

The study also critically addresses Jagannathan et al.'s (2020) concern that co-production may perpetuate existing power imbalances. It advocates for a proactive approach that recognizes and reconfigures entrenched hierarchies within urban planning and governance to facilitate transformative adaptation actions (Lotfata & Munenzon, 2022; Ruiz-Mallén, 2020; Siders, 2019; Wamsler, 2017; Ziervogel et al., 2016).

Empirical evaluations of initiatives such as Houston's NRP prove indispensable for understanding the complex role of co-production in nurturing cohesive, empowered, and sustainable communities. The study advocates a paradigm shift towards a transformative co-production approach that empowers marginalized communities and reimagines the interaction between science, policy, and practice in climate change mitigation (Bixler et al., 2022). The comparative analysis conducted herein has elucidated the significance of effective governance in enabling communities to undertake equitable climate action. This research thus serves as an actionable guide for policymakers and practitioners dedicated to fostering resilient and equitable urban development.

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Conflict of Interests

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About the Author



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