

Complexities and Costs of Floodplain Buyout Implementation

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Abstract

Public acquisitions of floodplain properties, or “buyouts,” whereby governments purchase properties at risk of flooding from willing sellers and convert them to open space, are a widely used strategy for reducing risk. Since 1990, the U.S. Federal Emergency Management Agency (FEMA) has provided funding for more than 40,000 properties. Yet, little is known about the costs of buyout implementation, even though federal funding requirements mandate a complex set of activities undertaken by local, state, and federal government staff. This lack of understanding of buyout activity costs hinders development of evidence-based policy recommendations. To address this gap, we surveyed 257 local and state government officials and consultants who have worked on floodplain buyout projects. Our survey results provide the first systematic, activity-level financial documentation of buyout projects in the U.S. Local and state government respondents reported median per-property activity costs of \$14,428 and \$8,161 (or 9.64% and 6.95% of property purchase costs), respectively. Respondents also reported significant variation in the activities undertaken as part of each project; community engagement strategies were particularly diverse, suggesting some households may not be adequately informed as a result of insufficient funding, time, or technical capacity for these activities. The varied and complex structures of buyout projects, as well as the attendant activity costs, pose barriers to implementation for local governments. Our results suggest both that: a) additional support and flexibility may be needed for critical activities that improve the experience of buyout participants; and b) reducing other activity costs may produce significant savings, which in turn could be used to improve the quality and expand the scope of buyout projects.

1. Introduction

Flooding is a major cause of loss of life and property damage in the United States, accounting for roughly \$100 billion in losses from 2010 to 2017 alone (Davenport, Burke, and Diffenbaugh 2021). With ongoing development in the floodplain (Climate Central and Zillow 2019) and with projections indicating heavier precipitation events and higher sea levels in coming years (USGCRP 2018), the impacts of floods will continue to grow. Retreat—defined as “relocating people and unbuilding land in places vulnerable to flooding and sea level rise” (Koslov 2016)—is an adaptation strategy that is becoming more widespread as communities across the country grapple with greater short- and long-term flood risks.

Floodplain buyouts are the principal form of retreat currently practiced in the U.S. If offered a buyout, a property owner at risk of flooding voluntarily sells their property to the government, which then removes any existing development and maintains the land as open space. Existing floodplain buyout programs have been criticized for taking too long to implement, communicating poorly with participating households, and exacerbating existing wealth and racial inequities (De Vries 2017; Elliott, Brown, and Loughran 2020; Loughran and Elliott 2019; Siders 2019; Weber and Moore 2019). These issues may arise in part due to different choices by local and state agencies about how to carry out a buyout program. While the U.S. Federal Emergency Management Agency (FEMA) has been the predominant funding source for buyouts to date, state and local governments have substantial flexibility in determining household eligibility criteria, communicating about buyout programs, and deciding what, if any, financial and social supports are offered to households through the buyout process. However, little is known about the variation in how different buyout programs are administered and the associated costs for governments. This deficit inhibits evidence-based policy reform that might produce more timely, equitable, and cost-efficient floodplain buyouts, benefitting both prospective buyout participants and implementing governments.

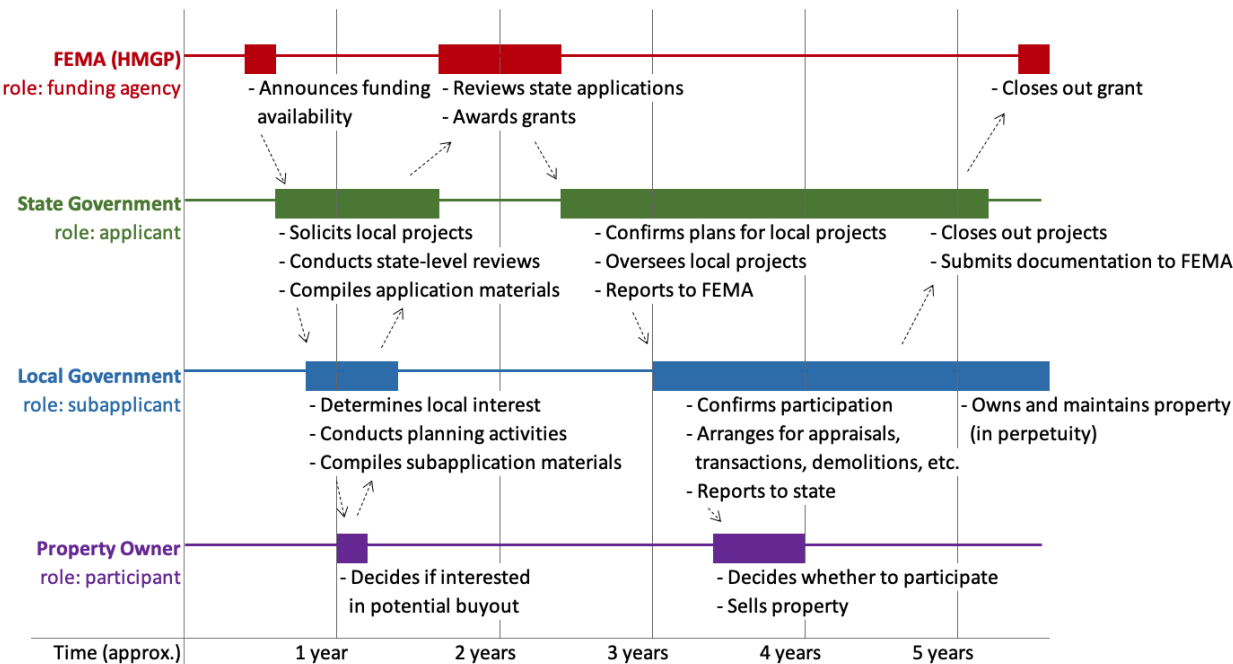
In this paper, we examine if and how choices by state and local governments affect the structure and costs of floodplain buyout programs. We developed and distributed a web-based survey to staff in local governments (in the State of North Carolina) and state governments (all state hazard mitigation officers in the US), as well as to private consultants (identified nationally) who have been involved in implementing buyout projects. We prompted respondents to identify a recent buyout project (i.e., a relatively complete project where their involvement allowed them to remember project details) and asked them about the activities involved (e.g., informing property owners about buyout opportunities; conducting benefit-cost analyses) and the actors responsible for conducting those activities and the staff hours and monetary costs incurred. We found that the costs of buyout activities—i.e., all costs other than those of purchasing the property—can be very substantial, with median activity costs of nearly \$23,000 per property across local and state activities. This assessment of activity-level buyout implementation enables a richer understanding of how state and local choices affect the design and costs of buyout projects.

2. Background

Floodplain buyouts ideally serve multiple complementary purposes, including to reduce the liability borne by the National Flood Insurance Program (NFIP); to reduce local and state governments' emergency response burdens following flood events; to reduce community flood risk by returning bought out properties to open space; to remove households from high-risk—both physical and financial—areas; and to relocate these households to better housing conditions, in terms of flood risk as well as other amenities (e.g., access to high quality schools and jobs; BenDor et al. 2020; Binder, Greer, and Zavar 2020; Loughran and Elliott 2019; Marino 2018).

As shown in Figure 1, individual US states are typically the direct recipients of federal buyout funding, with local governments receiving sub-grants from the state. Because there are frequently multiple local governments engaged in separate buyout projects funded by the same federal grant, the state government often plays a coordinative role. This role includes aggregating local governments' funding applications, providing administrative oversight, and sometimes undertaking or supporting technical buyout activities, such as conducting benefit-cost analyses. Typically, local governments are responsible for the bulk of project implementation, such as communicating with property owners, purchasing properties, and eventually, demolishing structures and maintaining the properties as open space, though states occasionally take on some of these responsibilities.

Figure 1. FEMA-funded buyouts require a complex series of activities coordinated across multiple levels of government. This diagram depicts the FEMA buyout process (stylized) with project duration along the x-axis. Adapted from Weber and Moore (2019) with permission.



The granting and sub-granting of federal funds affords state and local governments the ability to tailor buyout projects to their communities' needs and contexts. At the same time, this approach produces its own challenges: many local governments have only worked on a single buyout project to date (FEMA 2021), which means that they must figure out how to complete a complex process from scratch. Further, because the major flood events that prompt presidential disaster declarations are sporadic, many states and local governments experience staff turnover in the interim, limiting their institutional knowledge (Martin et al. 2019). The variation in local government size and capacity also influences how buyouts are

128 conducted, and for smaller governments in particular, limited staff capacity may significantly constrain
129 their ability to comprehensively plan for and implement buyout projects (Martin et al. 2019). These
130 dynamics contribute to significant variation in how local governments implement buyout projects; as
131 Greer and Binder (2017) have noted, buyout projects do not reflect systematic adoption of best practices.

132
133 The complex administrative set-up poses additional problems for state and local actors. For example, each
134 actor's actions are sequenced and dependent on those of other actors, leading to bottlenecks and
135 contributing to a median project length of five years (Weber and Moore 2019). State and local
136 governments are also constrained by an array of different program requirements. For example, while it is
137 common for local governments to leverage multiple funding sources to implement buyouts, such as
138 combining HUD's Community Development Block Grant-Disaster Recovery (CDBG-DR) program with
139 FEMA funding, they carry conflicting program requirements, imposing additional burdens on grantees
140 (GAO 2021; Martin et al. 2019). These add to the overall administrative costs of buyout programs, which
141 may be substantial (Curran-Groome et al. 2021).

142
143 State and local governments have developed alternative buyout funding and implementation programs to
144 address many of the challenges with federally-funded buyouts (Peterson et al. 2020). For example,
145 Charlotte-Mecklenburg Storm Water Services (SWS) operates a locally-funded buyout program that
146 enables the city and county to identify properties pre-flood and to acquire properties within months after a
147 flood event (Weber 2019b). This contrasts with federally-funded buyouts, where eligibility
148 determinations frequently occur over a year post-disaster, and where actual property acquisitions often
149 occur years after the precipitating flood event (Figure 1). The State of New Jersey's Blue Acres program,
150 which is operated out of the state's Department of Environmental Protection, likewise emphasizes
151 acquiring properties more quickly—in six to twelve months—than is typical under the federal funding
152 model. It achieves this, in part, by aggregating administrative tasks, such as layering funding from
153 multiple sources and conducting benefit-cost analyses, at the state level, where there are dedicated staff
154 focused on buyout funding and implementation (Weber 2019a). Understanding how different
155 administrative structures affect the outcomes of buyout programs is critical for ultimately maximizing the
156 benefits from these investments.

3. Methods

To address outstanding questions regarding the structures and costs of buyout projects, we developed and distributed a web survey to 249 respondents, including state government staff ($n = 65$), local government staff ($n = 171$), and buyout consultants ($n = 13$). The complete survey instrument is included as Supplementary Material 1. The purpose of the survey was to solicit information about the activities they undertook during buyout projects and the costs of those activities. Survey questions asked respondents to report information about a buyout project in which they were significantly involved; that occurred recently enough such that they remembered the details of the project; and that was either complete or as close to complete as possible.

3.1 Survey Development and Distribution

Survey questions were iteratively added, removed, and re-structured as a result of feedback from pre-testing cognitive interviews (Willis 2004). These interviews were conducted with local ($n = 5$), state ($n = 2$), and consultant ($n = 1$) respondents within a few hours after they completed the survey.¹ Interviewees were asked about their understanding of survey questions, ability to recall related information, and thought processes when providing answers. Interviewees also identified topics that were missing from the survey, as well as providing general feedback and information about their experiences with funding and implementing floodplain buyouts.

We developed an initial sample ($n = 219$) comprising buyout consultants ($n = 9$), North Carolina County Emergency Management Officers ($n = 87$); North Carolina Certified Floodplain Managers ($n = 19$); State Hazard Mitigation Officers ($n = 54$); relevant staff from North Carolina municipalities that have conducted floodplain buyouts ($n = 32$); as well as individuals who were both North Carolina County Emergency Officers and staff from North Carolina municipalities ($n = 12$). We also included in our sample six additional individuals identified by the project team to be substantially involved with floodplain buyouts; these respondents were included because they were identified as having extensive buyout experience or unique perspectives on buyout coordination and implementation (e.g., working with a locally-funded buyout program). Finally, additional respondents ($n = 30$) were identified via snowballing: respondents were asked to refer other individuals whom they knew had worked on floodplain buyouts.

We concentrated on identifying respondents in North Carolina for several reasons. First, North Carolina has conducted a significant number of floodplain buyouts ($n = 263$ FEMA-funded projects, second-most after Pennsylvania, and accounting for more than \$320 million in federal funds, third-most after Texas and New Jersey (FEMA 2021). Second, North Carolina has been the subject of extensive previous floodplain buyout studies (BenDor et al. 2020; De Vries 2017; Grace-McCaskey et al. 2021; Martin et al. 2019). Lastly, we hypothesized that the long-time connections between project staff and state and local government hazard mitigation officials could increase response rates.

The survey, conducted on the Qualtrics web survey platform (Qualtrics 2020), was distributed via email at the end of August 2020, with follow-up reminders sent to those who had not yet completed the survey at two-, three-, and four-weeks after the initial contact. Respondents identified via snowballing were emailed the survey and reminders along a similar follow-up schedule. To incentivize survey completion, we offered respondents a \$10 gift card, or the option to donate \$10 to a charity. The survey was closed at the start of December 2020.

¹ We attempted to also survey staff working at the federal level with FEMA and HUD but were unable to identify respondents who were sufficiently knowledgeable about buyout project funding and implementation and were allowed to provide project cost information.

3.2 Survey Structure

3.2.1 Screening Questions

To ensure that prospective respondents had relevant knowledge and were best equipped to complete the survey, we asked two screening questions: 1) “Have you ever worked on a floodplain buyout project?”; and 2) “Are you the best person to complete this survey, or has someone else at your organization been more significantly involved in floodplain buyout work?” Respondents who answered “no” to either question were not asked to complete the remainder of the survey.

3.2.2 Project Context

We asked respondents to identify the state and local government area in which the project took place, as well as up to three flood events that prompted the buyout project. Respondents were also asked to provide the date on which each listed flood event occurred, as this was important for contextualizing unnamed flood events, such as flash floods and local storms.

3.2.3 Property Attrition

We asked respondents to report both the number of properties they planned to acquire at the outset of the project, as well as the number of properties that were ultimately acquired. Implementing governments may incur activity costs on properties that they intend to—but do not ultimately—acquire.

3.2.4 Consultants

While consultants have been alluded to in the literature (e.g., GAO 2021; Martin et al. 2019), little prior work has systematically described the characteristics of consultants’ engagement with buyout projects. We captured data on the prevalence of consultants across buyout projects, their pay, and the buyout activities on which consultants worked. We defined consultants as “outside organizations, firms, or consultants [who] assist[ed] with any administrative or management aspects of [the] buyout project,” to distinguish consultants from contractors, who are frequently hired to implement a specific buyout activity (e.g., conducting appraisals or demolition).

3.2.5 Funding Sources

Prior work (GAO 2021; Weber and Moore 2019) has identified how the funding sources for buyout projects may influence projects’ structures, costs, and timeframes. While FEMA publishes hazard mitigation assistance data that document project funding amounts, these data do not elaborate on other federal funding sources, nor do they delineate how cost match requirements are met. We asked respondents to itemize the sources and volumes of all project funding, including match funding.

3.2.6 Relocation Assistance

Past research has noted the tension between floodplain buyouts as disaster recovery and floodplain buyouts as housing programs (Binder et al. 2020), but there is no systematic information regarding how buyout projects actively work to support positive housing outcomes for participants. We asked survey respondents to report the types of supplemental relocation assistance they provided to participants, including monetary and non-monetary forms of support.

3.2.7 Buyout Activities and Activity Costs

Respondents were provided with a list of common buyout activities, which we developed from the literature (e.g., Curran-Groome et al. 2021; Weber and Moore 2019) and during our pre-testing interviews. Activities were broken into five categories on the survey instrument: community engagement, planning, implementation, post-buyout, and state activities (only shown to state government respondents). For a list of individual activities presented to respondents, please refer to either Table S1 or Supplementary Material 1. Respondents were also able to enumerate other buyout activities not listed.

We first asked respondents to indicate the activities that had been completed as part of the buyout project, even if those activities were completed by another actor involved in the project (e.g., a consultant, or a different level of government). Local government respondents and consultants hired by local governments were only shown activities in the “Community Engagement” through “Post-buyout” phases (Figure 2), while state government respondents and consultants hired by state governments were shown all the activities pictured in Figure 2. This approach reflects that some state governments may be involved with or lead activities that are typically within the purview of local governments (Figure 1) and aligns with descriptions of project activities provided during pre-testing interviews.

For each completed activity, we then asked who had completed the activity (consultant, local government, and/or state government), the person-hours spent on that activity, the monetary costs devoted to that activity, and their confidence in the accuracy of their estimates, on a four-point scale from “Not at all confident” to “Very confident”.

3.2.8 Suggestions and Comments

We provided respondents with multiple opportunities to share their thoughts and suggestions regarding buyouts via open-ended questions. Respondents’ answers are integrated throughout the Results and Discussion.

3.3 Survey Analysis

All data analysis was completed using the R statistical computing language (v. 4.1.0; R Core Team 2021). To uniformly analyze differently denominated costs, we converted staff hours to dollar equivalents using the average total compensation cost for state and local government employees as reported by the Bureau of Labor Statistics (BLS) for 1990², 2000, 2010, and 2019 (BLS 2019); we linearly imputed compensation figures between these years. To account for inflation, we assumed all costs were incurred in the year of the most recent flood event reported by the respondent, and converted nominal costs from this base year to 2019 dollars using the *priceR* package (Condylis 2021). While we strived to ensure that survey language was specific and clear, some respondents’ (n=3) cost estimates were clearly anomalous (e.g., a state-level respondent erroneously reported activity costs over a thirty-year period, as opposed to for a single project); these responses were removed from the analysis where appropriate.

² In 1990, BLS only reported total compensation costs for private industry. We took the 1990 figure for private industry compensation and adjusted it by the ratio of state and local compensation in 2000 to private industry compensation in 2000 (1.463) to approximate the 1990 average local and state employee compensation rate.

4. Results

4.1 Response Rates

Of our sample of $n = 257$ (this includes eight respondents who pre-tested the survey), 73 respondents completed the two screening questions, producing a raw response rate of 28%. After accounting for the respondents who did not meet our screening criteria and were excluded from the substantive sections of the survey ($n = 31$; 42%), we had an adjusted response rate of 38%³. Of those respondents who did meet the screening criteria ($n = 42$; 58%), 12% ($n = 5$) were consultants working with local governments; 50% ($n = 21$) were local government employees; and 38% ($n = 16$) were state employees.

4.2 Project Structure

4.2.1 Timing and Location

Reported projects spanned 16 states; most ($n = 23$; 58%) occurred in North Carolina, while one to two projects each were reported from other states distributed across the continental U.S. While many respondents listed multiple flood events as contributing to the buyout project, most cited events occurring within the last five years, including 18 projects (46%) that involved flood events in 2016 and 9 projects (23%) that involved flood events in 2018. This is a reflection in part of the number of North Carolina-based projects, many of which were undertaken in response to flooding from Hurricanes Matthew (2016) and Florence (2018).

4.2.2 Funding Sources

Respondents reported receiving funding from a range of sources. FEMA's Hazard Mitigation Grant Program (HMGP) featured most frequently ($n = 32$ respondents; 91%), followed by state government budgets ($n = 8$; 23%) and HUD's CDBG-DR ($n = 8$; 20%). Nearly every respondent reported receiving most of their funding from federal sources; a single respondent (4%) reported an equal split between funding from state and federal sources. HMGP accounted for 42% of total funding for respondents' projects, followed by local government budgets at 25%, CDBG-DR at 22%, and state government budgets at 7%, with the remaining funding coming from a range of other federal, state, and local sources. However, after omitting projects funded by the Harris County Flood Control District, HMGP accounted for 68% of total funding, followed by state budgets at 17% and other state-level sources at 11%.

While the survey did not explicitly ask about the design of funding mechanisms, several respondents described challenges with federal funding requirements in open-ended responses. "Coordinate federal programs better (FEMA & HUD)," recommended one respondent. Another highlighted the multiple bodies of federal legislation and regulation impacting buyout projects, suggesting that, "[c]ompliance with other federal statutes like [the US Uniform Relocation Act⁴] or environmental standards such as addressing underground storage tanks should not count as costs under benefit-cost analysis."

4.2.3 Reimbursement

Multiple survey respondents reported challenges with the financial structure of buyout projects. Because FEMA's hazard mitigation programs are reimbursement-based, local governments must first incur

³ The adjusted response rate was calculated as a function of the total sample (n), the number of respondents (r), and the number of respondents meeting the screening criteria (m ; those not meeting screening criteria are therefore $r-m$): $m / \left(\frac{r-m}{r} * n \right)$

⁴ The Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (URA) (42 U.S.C. §§ 4621 et seq. (2020); 49 C.F.R. pt. 24 (2020)) is a federal law that establishes requirements for compensation and treatment of residents who are involuntarily displaced from their housing by federally funded programs. In the context of floodplain buyouts, which typically entail voluntary acquisitions, the URA applies to tenants, who are considered to be involuntarily displaced when the property owner voluntarily agrees to a buyout (Adaptation Clearinghouse 2020).

expenses and then submit documentation to be reimbursed for costs associated with buyout implementation (FEMA 2015a). Yet, in the words of one state government survey respondent:

“The typical mitigation project has a period of performance of 36 months. Over those 3 years a local government cannot afford to provide funding for work to begin at all properties in its project set simultaneously. As the local government can afford, the budget glidepath often looks like this: Year 1 will include the first third of the properties involved, the second year the second third and so on.”

Another respondent echoed this challenge: “FEMA needs to continue to support [buyouts], even if it is only a few buyouts at a time. *Local community budgets cannot afford to do it all at once* [i.e., purchase all the buyout properties] anyways (emphasis added).”

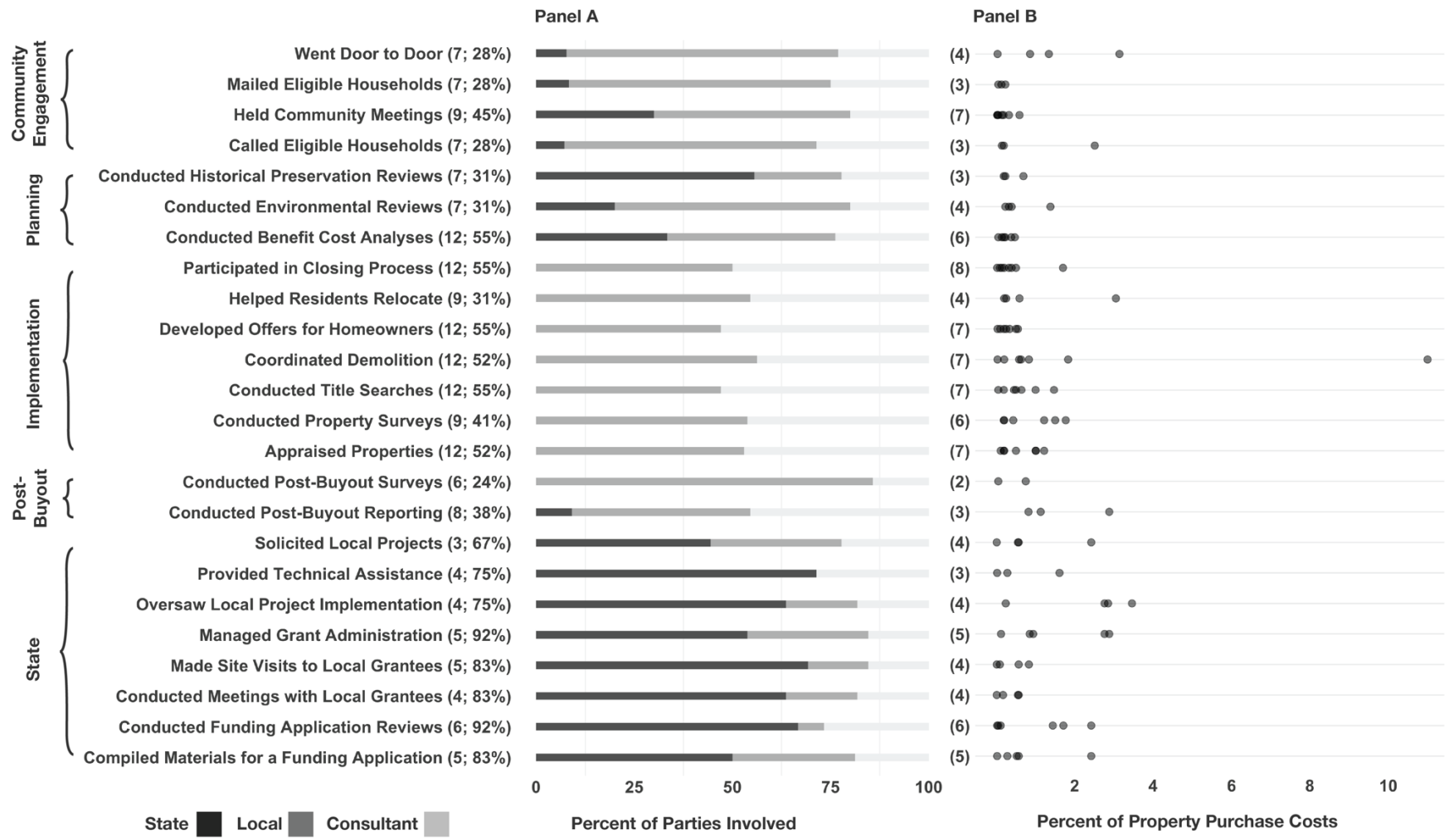
Other respondents highlighted challenges with how slow the reimbursement process was, separate from municipal budget constraints. One respondent wrote: “The financial model can be difficult to navigate at times... The state can be slow in reviewing the reimbursement requests and is not always clear about what documentation they need... This can lead to a significant lag in when requests for reimbursement are made and when the county actually receives the money,” a sentiment echoed by another respondent, who wrote: “Reimbursements to city often slow and tedious.” The reimbursement structure may contribute to the property attrition we document below.

4.2.4 Project Size and Property Attrition

Nearly all (93%; n = 14) local government respondents reported acquiring fewer properties than planned. Local government respondents reported planning to acquire a median of ten properties at the outset of the project and ultimately acquiring a median of six properties, while state government respondents reported planning to acquire a median of 10.5 properties and ultimately acquiring a median of 4.5 properties. In comparison, across all FEMA-funded buyout projects, the median number of properties that implementing governments planned to acquire was four, and the median number of properties actually acquired was three (FEMA 2021).

One survey respondent elaborated on how the delay between a flood event and buyout offers can impact participants: “[The] homeowner is burdened with paying a second mortgage/rent, taxes and insurance on a property while they are waiting for a buyout”, which can create “financial burdens and credit damage as a byproduct. This further contributes to homeowners [dropping out of] buyout programs, ultimately leading to continued damages and little mitigation affect (sic).”

361 **Figure 2.** Local governments and their consultants were exclusively responsible for implementation activities (Panel A), while individual activities across
 362 phases consistently accounted for up to three percent of property purchase costs each (Panel B). Panel A: share of projects in which the various parties were
 363 involved in each buyout activity. Panel B: cost of each activity as a percentage of property purchase costs; each dot represents a buyout project. The number of
 364 responses (n) and the percentage of respondents indicating each activity was completed are reported in parentheses. Responses in Panel B are not disaggregated
 365 by respondent type. Note: Respondents also itemized the costs of write-in activities, which are omitted from this figure.



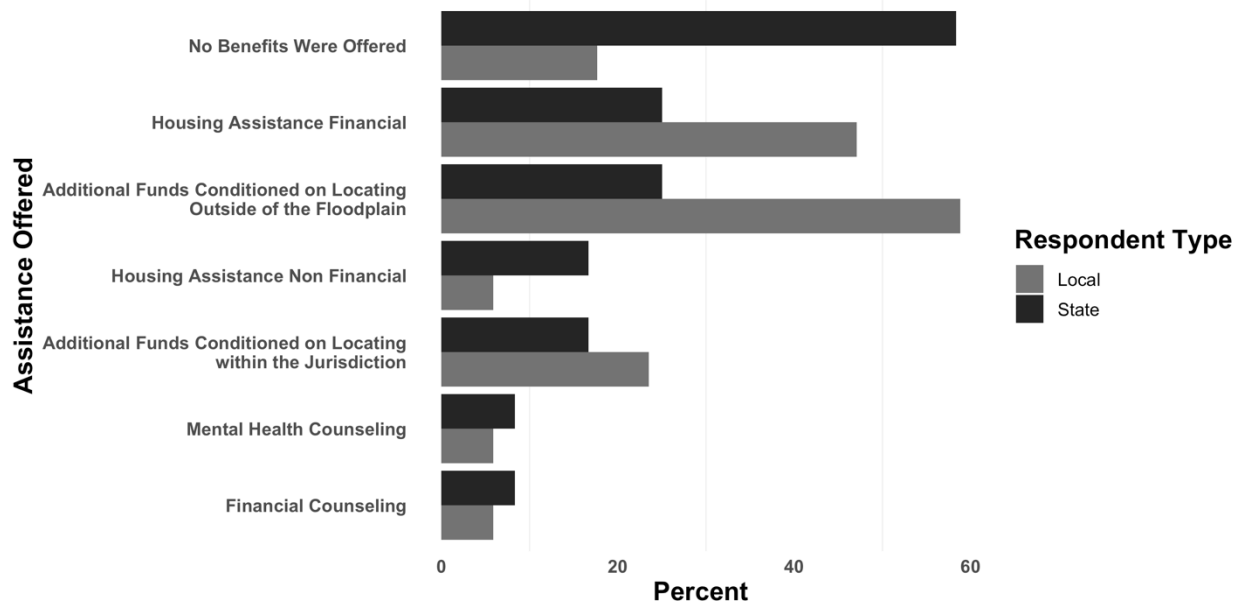
4.3 Project Implementation

4.3.1 Relocation Assistance

Most local respondents (including consultants hired by local governments) reported offering some type of financial assistance (most often funds for relocation outside of the floodplain) to support relocating households, while some also offered counseling and other types of non-financial resources (Figure 3). There was a clear divide among state and local respondents: only 18% (n = 3) of local respondents reported providing no benefits of any kind, in comparison to 58% (n = 7) of state respondents. In part, this divide may reflect that most of our local respondents were from North Carolina, where the State's Acquisition and Relocation Fund provides supplemental funds to support relocation of buyout participants (NC Office of State Budget and Management 2007).

In open-ended comments, multiple respondents voiced concerns about replacement housing, particularly for households that might struggle to find affordable new housing comparable to their prior housing. For example, one respondent wrote: "FEMA should improve their URA [US Uniform Relocation Act] assistance structurally within the grant programs to ensure that for [low and moderate income] property owners safe, sanitary housing can be obtained, *even if that is additional assistance outside of URA* (emphasis added)."

Figure 3. Assistance was often provided by local government respondents but was relatively rarely provided by state government respondents. Relocation assistance, by type of assistance and respondent; consultants for local governments were considered local respondents.



4.3.2 Buyout Activity Costs

Individual activity costs incurred by local respondents typically accounted for a very small portion of property purchase prices. Some entire phases of projects (community engagement, planning, and post-buyout; see Supplementary Materials Table S1) accounted for a median of less than one percent of property purchase prices (Figure 2). However, implementation activities in total accounted for a median of 1.88% of property purchase prices (mean = 5.1%), and on one project, accounted for 15% of property purchase prices. State activities, meanwhile, accounted for a median of 7.5% of property purchase prices (mean = 5.78%).

Costs across all buyout activities undertaken by local and state actors often accounted for thousands of dollars of expenses for each property acquired: the sum of median per-property activity costs at the local

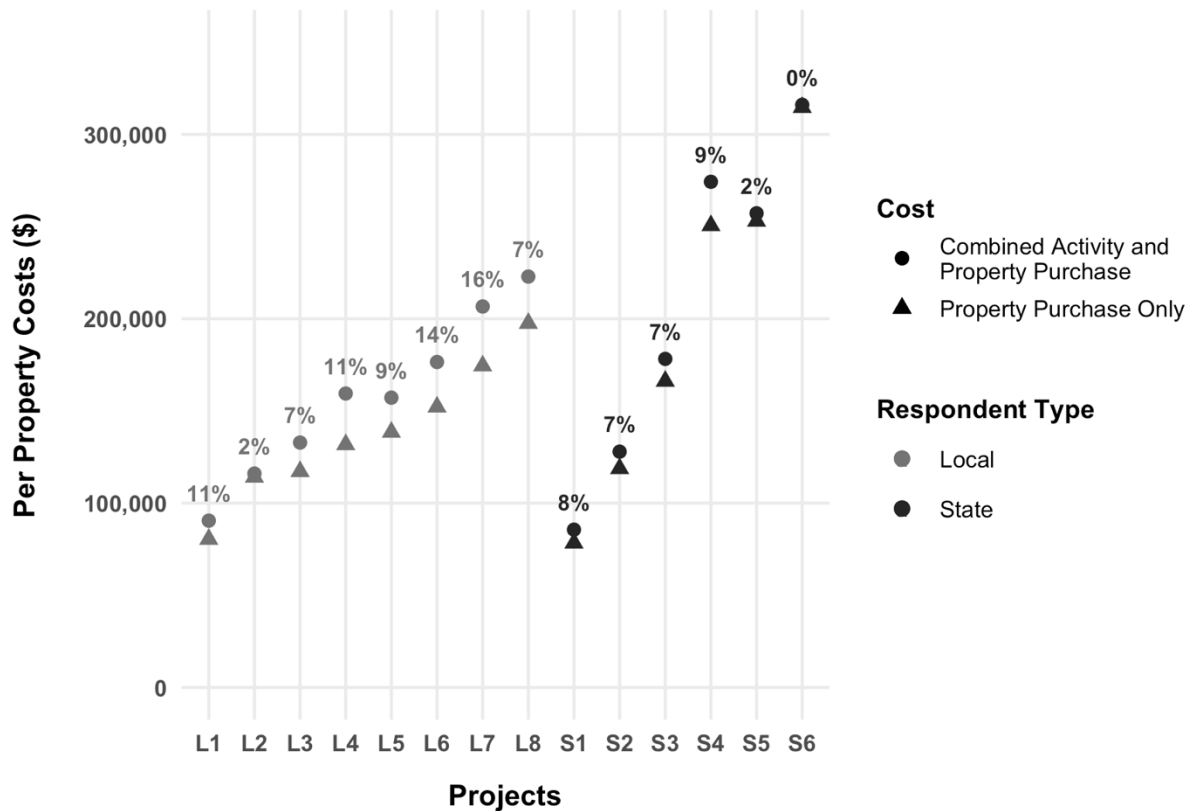
and state levels was \$22,589 (n = 14; mean = \$24,846), which accounted for a median of 18.3% (mean = 16.6%) of property purchase costs (Table 1). The maximum per-property activity cost reported by a local respondent was \$32,168, or 18.4% of property purchase costs; for state respondents, the maximum per-property activity cost was \$23,739, or 9.5% of property purchase costs. Figure 4 visualizes the per-property costs of buyout activities, in addition to property purchase prices, for each project detailed by survey respondents.

Table 1. Activity costs by respondent type. Note: Because state and local government respondents described separate buyout projects, “combined” costs represent the sum of median or mean activity costs across projects. Combined costs are not equivalent to the total activity cost per project.

Respondent Type	Per Property		As a Percent of Property Purchase Costs	
	Mean (\$)	Median (\$)	Mean (%)	Median (%)
Local	15,212	14,428	10.68	10.81
State	9,634	8,161	5.95	7.47
Combined	24,846	22,589	16.63	18.28

When we exclude the two observations that did not report costs for all of the activities comprising their buyouts, the combined median per-property activity cost rises to \$24,595 (n = 12; mean = \$27,822), accounting for a median of 19.6% (mean = 18.8%) of property purchase costs. Respondents rated their confidence in their activity cost estimates as “Somewhat Confident” or higher for most activities (on a four-point scale: “Not at all confident”; “Only a little confident”; “Somewhat confident”; “Very confident”). Additional analyses of confidence ratings are presented in Supplementary Material 2.

Figure 4. State and local respondents reported incurring thousands of dollars of activity costs per property. Property purchase costs and combined (both activity and property purchase) costs per property across 14 individual projects from local (L1-L8) and state (S1-S6) respondents; labels provide project activity costs as a percentage of property purchase costs.



5. Discussion

Our survey results provide the first systematic, activity-level financial documentation of buyout projects in the U.S. Respondents reported that activity costs at the local and state government levels account for approximately \$23,000 per property for the median buyout project, or roughly 18% of property purchase costs. These costs are the result of federal funding requirements and local and state government choices about how to organize and implement buyout projects.

Our analysis indicates that additional funding could enable more comprehensive approaches for community engagement and relocation assistance, consistent with conclusions from prior research (Binder et al. 2020; Kraan et al. 2021). Each enumerated community engagement activity, from holding community meetings to mailing informational letters, was employed on fewer than half of all projects (Figure 2A). Implementing governments also reported providing a variety of forms of financial and non-financial relocation assistance, though such assistance is not usually required.⁵ Relocation assistance can serve as an incentive to relocate outside the floodplain or in the same municipality, county, or state (e.g., North Carolina's State Acquisition and Relocation Fund [BenDor et al. 2020]) and can reduce financial

⁵ FEMA and HUD have no requirements for relocation assistance, though US Uniform Relocation Act (URA) requirements may apply in cases where renters must relocate (FEMA 2015b). State funding sources may or may not impose relocation assistance requirements.

barriers to acquiring high-quality replacement housing [Kraan et al. 2021]). However, non-financial assistance, such as mental health counseling, was comparatively little used, despite potential need. The variation in engagement and assistance provided across projects suggests that additional funds could help local governments in reaching potential participants and in more comprehensively supporting those who choose to relocate.

Respondents also identified constraints with existing funding. In particular, respondents discussed challenges with ongoing use and maintenance of acquired properties, including how narrowly FEMA defines allowable uses and the need for additional funding to support the burden of property maintenance costs. Supplemental funding tied to specific post-buyout land uses (e.g., floodplain restoration), paired with technical assistance around open space management, could address the fiscal and technical capacity limitations that may otherwise prevent local governments from leveraging buyouts to promote better environmental and social outcomes (Zavar and Hagelman III 2016).

While sustaining or increasing support for certain activities is key to improving project outcomes and household experiences of buyout projects, there may be opportunities to reduce the costs incurred on other activities that are not directly tied to those outcomes. Per one respondent: “My suggestions would be clear and concise policies and messaging from the state to the potential subgrantee or other... unit of local government so that expectations and the process is understood. This will reduce a lot of the *duplicative work and frustration that is currently rampant* (emphasis added).” Some respondents touched on more fundamental restructurings of the buyout implementation paradigm shown in Figure 1. One state government respondent wrote: “The state... is exploring different implementation strategies... The most significant of these changes is retaining the implementation of the grant at the state level and, as such, retaining the policy creation, SOPs [standard operating procedures], and procurement... This lightens the load on local governments—some of which are disenfranchised by the cumbersome model of buyout implementation.” Some local government staff agree: “The buyout program is very long and exhausting at the local level, both for staff and for applicants. It seems that by the time we complete a program, *it would have been much more cost effective and expedited if the state had managed the program* (emphasis added).” Reducing undesirable activity costs could redirect funds to more valuable activities, enable more properties to be purchased, or make projects more feasible for local governments with limited capacity.

Identifying bottlenecks in the buyout process could also address property attrition. Both our survey results and FEMA’s records indicate that property attrition is common and significant, with many projects acquiring fewer than half of the properties they initially set out to. The resources expended in recruiting and submitting applications for properties that are not ultimately acquired are resources wasted. Attrition is particularly concerning when households drop out because they cannot afford to continue waiting indefinitely to receive an offer, a phenomenon that could drive inequities in buyout participation. As attrition drives down the number of properties acquired per project, it may also prevent projects from leveraging efficiencies that accrue to larger projects, such as more robust community engagement or lower per-property costs for contracted services (e.g., property appraisals, environmental reviews). Further, attrition can produce checkerboard acquisition patterns, undermining both environmental (Brody et al. 2017; Zavar and Hagelman III 2016) and fiscal goals for buyouts (BenDor et al. 2020); in this sense, even a relatively limited number of properties lost to attrition can have significant impacts on the benefits of a buyout project.

FEMA’s current approach of capping “management costs”—those costs associated with preparing grant applications, conducting grant reporting, and other indirect costs—recognizes that some activity costs are undesirable, but does not address the underlying policies and structures that drive these costs. HMGP, for example, limits “management costs to 10% for primary applicants, and 5% for sub-applicants” (FEMA 2020). As one survey respondent noted, “the administrative costs to implement the buyout program has (sic) been reduced to a point that future projects may not be feasible for [consultants] to participate in

assisting small local governments.” Yet, past work has found that local government capacity can influence which communities apply for and receive buyout funding (e.g., Mach et al. 2019; Martin et al. 2019), which in turn may produce inequities in terms of who is able to take advantage of these opportunities. If smaller local governments rely on the expertise and capacity of consultants to help them prepare applications for and execute federally funded buyouts, limiting reimbursement levels for these costs may disproportionately limit smaller communities’ access to buyouts.

Activity costs reported by local and state survey respondents—with median costs summing to \$22,589 per property—provide a baseline understanding of non-purchase costs, but there are multiple reasons to treat these estimates as a lower bound. Activity costs are incurred not only by local and state government staff, but also by federal government staff and prospective buyout participants. We were unable to measure costs incurred by federal agencies and by individuals interested in participating in a buyout, yet we know that the bulk of floodplain buyout funding originates with federal agencies (Peterson et al. 2020), and that prospective buyout participants incur time costs as they acquire information about buyout opportunities and complete various buyout processes. Buyout projects may also incur costs that are not formally documented on grant budgets or municipal ledgers, such as the time of local politicians as they facilitate discussions about buyout opportunities and possibly seek political support at higher levels of government (e.g., Brady 2015; Knobloch 2005).

Challenges with collecting activity-level cost information from survey respondents point to the need for more systematic collection of these data. Relatively few respondents were able to provide any activity cost information. One issue is that, as one respondent noted, “[budgets are] not broken down this way.” (See also Curran-Groome et al. 2021). Another issue was that some respondents (n = 2; 14%) were unable to provide activity cost estimates for all the activities they reported occurred, and that confidence in cost estimates was, at times, low (see Figures S1 and S2 in the Supplementary Materials). Missingness and low confidence may be attributable in part to the time elapsed since the buyout project, the number of staff involved and high rates of staff turnover, the lack of accurate or consistent accounting and recordkeeping, the multiple levels of government at which costs are incurred, and the timespans over which hazard mitigation work occurs. Without standardized data collection and reporting by FEMA and HUD, it will continue to be difficult to comprehensively evaluate buyout project expenses.

We focused on local government respondents primarily from North Carolina and leveraged snowball sampling to reach other respondents. While North Carolina’s approach to FEMA-funded buyouts is similar to those of many other states, additional evaluations are needed to ensure that our survey results are representative of the broader population of buyout projects. Regardless, this study serves to illustrate the activity costs and other parameters of a range of buyout projects. We have provided the survey instrument in Supplementary Material 1 in the hope that others will replicate our approach using additional samples and geographies.

6. Conclusion

Our results point to multiple opportunities to improve the speed, cost, and outcomes of buyout projects. Investing in critical buyout activities can reduce delays, attrition, and miscommunication, while supporting more equitable participation in buyout projects. As the largest federal funder of buyouts in the U.S., FEMA could improve the buyouts process by ensuring that it has sufficient staff available to support grantees (states) and sub-grantees (local communities) with implementing buyout projects, or by funding grantees such that they can provide high quality technical assistance to sub-grantees. FEMA could also examine its existing standards for community engagement activities to ensure that local and state governments meet baselines for how and whom they inform about buyout opportunities. Survey respondents reported a wide range of outreach strategies, few of which were used consistently across projects; template communications materials and more detailed guidance from FEMA and states could help to increase the quality and reach of communications while reducing burdens on local governments. Such changes could also help to prevent inequities in awareness of, and access to, buyout programs.

At the same time, there may be opportunities to reduce the costs incurred by activities that are not driving project outcomes. Eliminating or limiting the scope of these activities may allow implementing governments to cut down on costs, repurpose these expenses for more impactful activities, and shorten the period between a flood event and when property owners receive buyout offers. Structurally, it could be beneficial for FEMA to explore opportunities to support grantees and sub-grantees in more efficiently organizing buyout activities to take advantage of economies of scale and staff specialization. The state-led implementation model adopted by the State of New Jersey's Blue Acres program is one such approach. However, alternate approaches, such as aggregating implementation responsibilities at the county or metropolitan level, or merely reserving certain technical implementation responsibilities (e.g., conducting benefit-cost analyses or conducting title reviews) at the state level, may also be worthwhile to explore. FEMA could also evaluate whether provision of supplementary relocation assistance could help the Agency better achieve its goals. By providing participants with additional payments contingent on relocating outside of the floodplain, FEMA could support better and more equitable housing outcomes for participants while also reducing flood risk and floodplain development concerns.

Ultimately, reconsidering the activities required as part of federally-funded buyout projects, the share of funding dedicated to each activity, and the various actors responsible for implementation may help to drive policy reforms that improve multiple domains of project quality for participants and implementing governments alike.

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