

STRATEGIC PROPERTY BUYOUTS TO ENHANCE FLOOD RESILIENCE

CREATING A MODEL FOR FLOOD RISK REDUCTION,
COMMUNITY PROTECTION AND ENVIRONMENTAL GAINS





OVERVIEW

- In August 2017, Hurricane Harvey flooded hundreds of thousands of homes in Texas, causing an estimated \$125 billion in damage. In the Houston metro area, a growing population, shifting weather patterns and the unabated development of buildings and paved surfaces that are unable to absorb storm water all exacerbated Harvey's impact.
- Nature provides vital protection that can reduce the severity of storm damage. Combining nature-based solutions with smarter development enhances the resilience of our communities.
- In areas that suffer from repeated flooding, voluntary property buyout programs are often a cost-effective approach to flood reduction. Property owners are given the opportunity to sell their property at fair market value; once sold, the flood-prone structures are removed and the property is returned to open space.
- While well-intentioned, these programs are often less effective in their execution. The traditional buyout approach is typically initiated in a reactionary, ad hoc manner—after flooding has already done its damage. This creates a checkerboard pattern of vacant lots. Clustering properties for buyouts and considering their proximity to open spaces produces additional environmental and social benefits, helping to better protect communities over time.
- Using post-Harvey damage assessments, this study developed a strategic approach to buyouts that prioritizes proximity to natural features and promotes the clustering of buyout properties.
- Results show that the buyouts are cost effective even when proximity to other buyout parcels and to existing open space are included in the selection process. Including these additional criteria does not undermine cost effectiveness and creates green spaces that add multiple values.
- The study provides a roadmap for buyout selection that can enhance open space, reduce flood risk and create more natural amenities for residents to enjoy. In Houston and across coastal and flood-impacted regions nationwide, it can help leaders develop strategic buyout programs that create safer, more resilient communities.



JOHN STEPHEN CHANDLER

REDUCING FLOOD RISKS WITH BUYOUTS

U.S. cities continue to experience unprecedented growth, creating more buildings, sidewalks and roads that are unable to absorb storm water—much less protect communities from increasingly frequent and catastrophic weather events like Hurricane Harvey. Creating and restoring natural elements can help provide a first line of defense against these impacts. Enhanced open space, for example, can help communities better absorb storm waters and protect against flood damage.

Hurricane Harvey's deadly impact sparked a national conversation about reducing flood risk and increasing storm resilience. In Harris County, which comprises much of Houston and the surrounding area, hundreds of thousands of homes are eligible for voluntary buyout but without adequate funding or capacity to meet the need. These are areas that have flooded before and are continually at risk of flooding again.

Buyout programs are designed to remove properties in flood-prone areas and restore them to green space that can better absorb storm water. This can help reduce flood risk, lighten the load for first responders and lower flood insurance claims and payments. In many cases, buyouts are a more cost-effective alternative to larger flood control infrastructure like drainage pipes and detention basins. However, property buyouts are most often initiated after major storm events have occurred, reducing their efficacy and resulting in a checkerboard pattern of vacant lots. Well after Hurricane Harvey touched down, there are still tens of thousands of residential parcels in Harris County that are eligible for buyout and vulnerable to the next natural disaster. This story is repeated in coastal cities across the country.

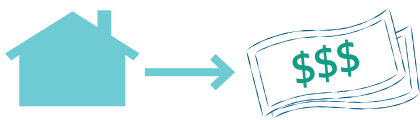


Out of all properties affected by Hurricane Harvey, approximately 3,500 have experienced repetitive flood loss claims, totaling approximately \$634 million between 1978 and 2017.

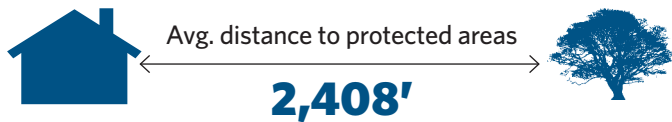
BUYOUTS

Our study explored multiple scenarios for being more strategic about buyouts. This infographic shows the attributes of buyouts selected using the existing requirements in Harris County and compares them to one of the buyout scenarios explored in our study. The proactive model displayed here prioritizes clustered buyouts that are close to natural features and ultimately can result in fewer, larger patches of open space that can be restored to benefit people and nature.

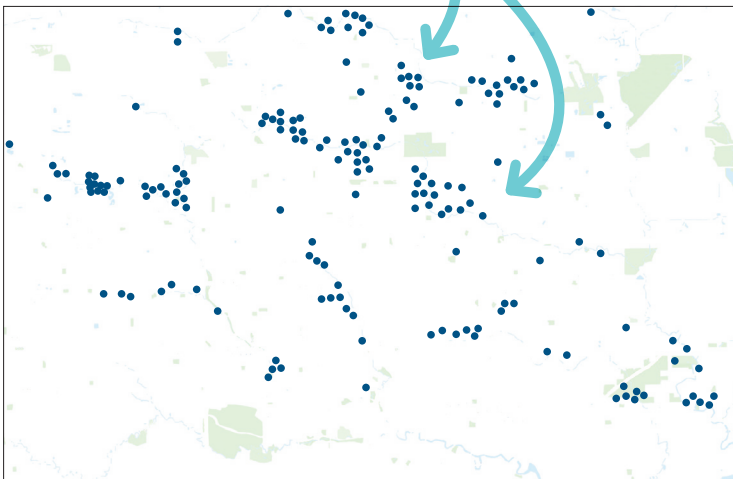
BUSINESS AS USUAL



Cost effective flood mitigation



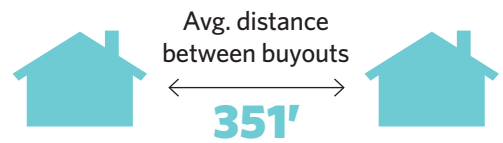
Buyouts are scattered



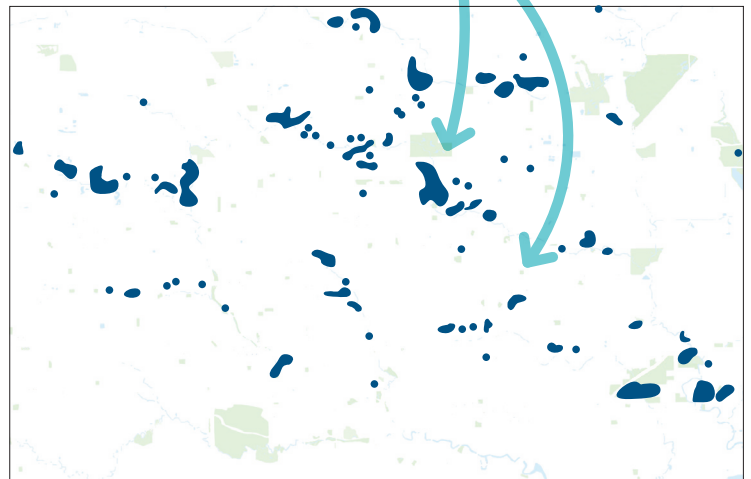
A PROACTIVE MODEL



Cost effective flood mitigation with multiple benefits



Buyouts are clustered together





PLANNING FOR BUYOUTS BEFORE THE NEXT STORM

The Nature Conservancy and Texas A&M University partnered on a study to examine whether a more proactive buyout approach could be designed to produce environmental benefits while remaining a cost-effective option for reducing flood risk. Findings were encouraging, indicating that a smarter buyout approach that promotes clustering and proximity to existing open space can potentially result in big environmental gains.

Using a coupled analysis of flood loss claims and estimates from over 74,000 properties affected by Hurricane Harvey in Harris County, the study calculated each parcel's history of flood loss as well as its proximity to natural features like floodplains, wetlands, parks and other protected areas. Eligibility was also restricted to properties near existing buyouts.

HOW WE MEASURED COST EFFECTIVENESS

For each buyout scenario, we calculated a Damage-Market Value Ratio (DMVR) to better understand the financial consequences of acquiring properties for flood risk reduction purposes. This variable was measured as the total flood loss (Harvey and previous flood events) for all parcels being considered divided by the assessed market value of the property. This variable signifies the amount of financial loss that would have been avoided if the properties were acquired and taken off the tax roll even when considering the loss of economic value. A ratio higher than 1 indicates that the scenario would have a net financial benefit to the community.

The results revealed a positive cost-benefit ratio across all buyout scenarios examined. This means that the cost of the properties was less than the repetitive loss history of the properties. Furthermore, a strategy that selects for environmental value was shown to be as cost effective as the traditional, checkerboard approach—with added ecological and social benefits. This more proactive approach would generate nearly 1,100 potential buyout properties in Harris County, with market values ranging from \$1.37 - \$135 million. These findings create a model for flood-impacted communities across the country to develop smarter, more strategic buyout programs to generate positive economic, ecological and social impacts over the long term.

TRANSFORMING STUDY FINDINGS INTO PUBLIC POLICY AND ON-THE-GROUND ACTION

Smart public policy actions can help translate the results of this study into proactive buyout programs in Harris County and communities across the United States in three important ways.

Decision makers, such as the Harris County Flood Control District, can use these findings to strategically prioritize buyout investments to achieve multiple benefits while maintaining a positive cost-benefit ratio. Integrating environmental value data into buyout decisions adds ecological and social benefits without sacrificing the bottom line.

Continued and sustained financial investments at all levels—federal, state and local—are critical to enable communities to deploy strategic, more clustered buyouts. For example, in Harris County, voters overwhelmingly (by over 85 percent) approved a \$2.5 billion flood mitigation bond proposition in August 2018 to support projects like voluntary buyouts of flood-prone properties and property acquisition for preserving natural floodplains. Addressing our increasing flooding challenges requires commitment and funding at all levels, and these types of local initiatives help activate and leverage federal funding.

Additional financial investments—through existing buyout programs or other funding mechanisms—are needed to move beyond simply acquiring flood-prone properties and toward reclaiming the services and benefits these properties offer. Acquiring properties and removing structures are just the first steps; working with affected communities to reclaim the environmental and social benefits of these spaces gives us an opportunity to restore and enhance neighborhood living for local residents.

The Nature Conservancy is currently working with communities in Austin and Houston, Texas to demonstrate how we can effectively restore floodplain buyout areas and other natural spaces. These examples demonstrate how communities can begin to rethink the use of urban open space for multiple advantages, including: protecting human lives, reducing flood risk, providing environmental and wildlife benefits, increasing access and connectivity to green space and creating community gathering spots with opportunities for cultural and educational programming.

THE NATURE CONSERVANCY ON THE GROUND: URBAN PRAIRIE RESTORATION IN HOUSTON, TEXAS

Hurricane Harvey revealed Houston's vulnerability to flooding, which is exacerbated by the city's thousands of square miles of impervious cover. To address this challenge, organizations like Katy Prairie Conservancy and The Nature Conservancy are establishing "pocket prairies" in the greater Houston area. Pocket prairies are small patches of native plants planted in urban lots—like buyout properties. These spaces serve as low maintenance open space with a high-value natural habitat, absorbing and filtering storm water runoff, sequestering carbon, protecting biodiversity and providing opportunities for urban dwellers to connect with nature. Since 2008, more than 50 pocket prairies have been planted across Houston.

THE NATURE CONSERVANCY ON THE GROUND: WILLIAMSON CREEK CENTRAL GREENWAY IN AUSTIN, TEXAS

The Williamson Creek Central Greenway project seeks to reimagine existing buyouts in a flood-prone area of south Austin as a resilient, connected greenbelt. The Nature Conservancy, the National Park Service and local neighborhood groups are engaging the community to develop a safely floodable greenbelt that also enhances the neighborhood's social, cultural and natural features. This is the first phase of a multi-step process to create a community-led vision for buyout properties and implement restoration and long-term stewardship for the benefit of floodplain resilience, community needs and wildlife.

Benefits of Strategic Buyouts



◀ Over time, can lead to clusters of open space that can be used as green infrastructure to restore the functions of floodplains, absorb and clean storm water, provide space for outdoor recreation and improve the visual character of urban areas

- As cost effective as traditional buyouts

- Less expensive to manage fewer, larger areas with multiple functions rather than scattered, empty lots
- ▶ Added benefits for people and wildlife



◀ From 1992-2010, Houston lost wetlands that could detain 4 billion gallons of storm water (\$600 million in lost storm water detention).

- The \$2.5b flood bond passed on Harvey's anniversary in August included funding for both traditional infrastructure repair as well as taking a look at things like detention ponds restoration.

- Research shows that every square meter of Houston pavement equates to \$4,000 in extra flood damage. (Sam Brody/TAMU)



Students plant native prairie grasses at Rice University in Houston.

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