

Stories from the Watersheds: How Harvey Impacted Houston's Neighborhoods

By Nadia Abouzir

It is no secret that Hurricane Harvey devastated Houston, but how did it impact the city's individual communities? Floodplain maps offer insight into where the risk is greatest to experience a 100- or 500-year flood, but many of the affected neighborhoods surpassed these thresholds in 2017.

Though some local officials disagree, urban expansion in and around the city's twenty-two watersheds prior to Harvey is believed to have caused some homes that did not flood initially to become more susceptible in recent years. As Houston's population grew, the city expanded geographically through annexation and urbanization, building more suburbs and infrastructure where forests, prairies, and wetlands once graced the landscape. These outward developments, which exceeded 167,000 acres between 2001 and 2010, are further promoted by highway expansion.¹ The neighborhood experiences found here shine a light on how overdevelopment in some parts of Houston and underdevelopment of flood control infrastructure affected nearby communities.

CENTRAL AND SOUTHWEST HOUSTON

Central Houston along Buffalo and White Oak Bayous suffered extensive damage during Harvey, with water levels exceeding the city's high-water mark set in 2001's Tropical Storm Allison by at least five to seven feet. Buffalo Bayou acts as the main drainage system for both the Buffalo Bayou and White Oak Bayou watersheds with the two merging near downtown. Both bayous have been rectified — the process of widening, straightening, and lining a channel with concrete — to reduce flooding, but that method has been under scrutiny for over fifty years. Although intended to mitigate flooding, the technique has proved disastrous because it pushes water through the bayou with added force and velocity.² Thus, when Harvey swept in, overflow from Buffalo Bayou spilled over much of Central Houston.

Experts hypothesize urbanization and the proliferation of skyscrapers also play a role in this increased flooding. With Houston's decentralized nature, concrete covers large swaths of the region, causing rain that was once absorbed into the ground to pool on top of it. Further, the mass of tall

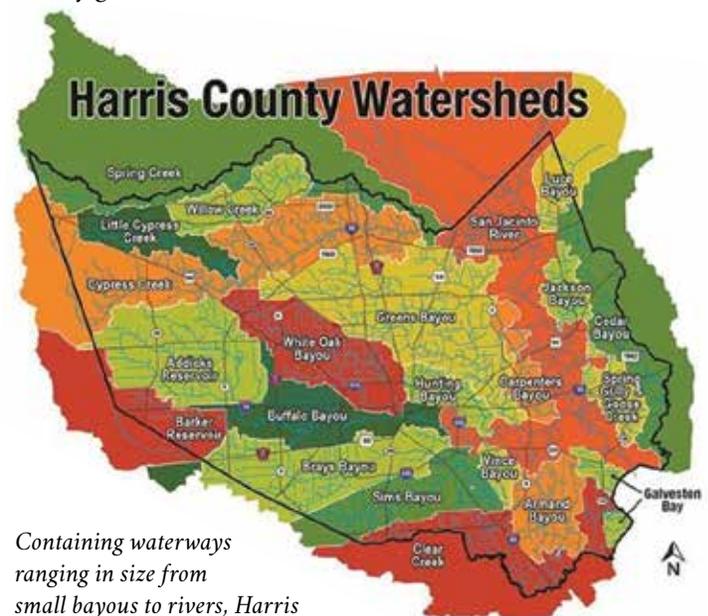


Running along Buffalo Bayou, Eleanor Tinsley Park was completely submerged after Harvey's rains. Photo courtesy of J. Daniel Escareño, Flickr.*

buildings, climate scientists Gabriele Villarini and Gabriel Vecchi argue, stops the air from moving forward, and instead pushes the moist, hot air into the cooler air above. This process creates an optimal environment for dense cloud formation, causing more rainfall in the city.³

In Southwest Houston, Brays Bayou, another rectified waterway, also reached record flood levels when Harvey's rainfall exceeded the 500-year flood mark in the Brays Bayou

watershed. Candace Beverly lived two blocks away from the bayou and had flooded during the 2015 Memorial Day flood. After Hurricane Harvey hit, many of her neighbors who stayed behind had to walk out of the subdivision through chest-high water. Her neighborhood, situated between Fondren and South Gessner, was under water for three days. When Beverly returned home, she found much of her furniture destroyed along with the home's infrastructure. Fortunately, neighbors, University of Houston students, All Hands Volunteers, and church members helped Beverly's family gut and fix their home.⁴



Containing waterways ranging in size from small bayous to rivers, Harris County's watersheds and sub-watersheds collect and drain rainfall into Galveston Bay.

Photo courtesy of the Harris County Flood Control District.

Local residents organized some of the area's volunteer efforts. For example, University of Houston history professor Douglas Erwing, whose University Oaks home near the campus and Brays Bayou did not flood, called on his students to help. For weeks, he organized them to muck and gut houses, feed the elderly, and volunteer at Lakewood Church.⁵

Currently, the Harris County Flood Control District (HCFCD) and the U.S. Army Corps of Engineers are involved in a project to reduce the flood risk along Brays Bayou. C-11 Project Brays is focused on seventy-five individual projects along the bayou that include widening the bayou from the Houston Ship Channel to Fondren Road and modifying bridges along the way. It will create four new detention basins to hold 3.5 billion gallons of stormwater.⁶

KASHMERE GARDENS AND NORTHEAST HOUSTON

While many Houston neighborhoods were nearly or fully recovered from Hurricane Harvey within a year, Kashmere Gardens remained largely underserved in 2018. The area is home to about 10,000 residents, 98 percent of them people of color, and 55 percent having an income under \$25,000 as of 2015. Located in the Hunting Bayou watershed, over 75 percent of the homes in Kashmere Gardens had flooded by August 27, 2017.⁷

Although the storm was terrifying, rebuilding their homes and community presented residents with the greatest challenge. A year after Harvey, long-time Kashmere Gardens resident Erin Jenkins still had numerous leaks in her ceiling, rampant bug infestations, and a smell that would not go away, leaving her feeling like she had lost her home completely to the storm. Eligible for FEMA disaster funding, she, and others like her, received an average of \$4,300 — a miniscule amount compared to the cost of restoring her home, which remained incomplete in 2018.⁸

Located in a flood zone, many area residents were unaware that if they had received FEMA flood assistance in the past, FEMA required them to have flood insurance to receive aid again. The rising cost of premiums — up to \$1,100 — made flood insurance cost-prohibitive for many, resulting in FEMA denying their funding. For these residents, looking for financial assistance was a time-consuming, frustrating process that burdened them further.⁹



In Lakewood, a neighborhood northeast of Kashmere Gardens, lifetimes of furniture and decorations became rubbish on the side of the road.

Photo courtesy of Revolution Messaging, Flickr.*

KINGWOOD

"That's just a fluke," many in Kingwood thought after the area, located by Lake Houston in the San Jacinto River watershed, flooded in 1994. Previously documented at a maximum height of 52.3 feet in October 1994, water levels at the Lake Houston Spillway were almost a foot higher during Harvey. Hundreds of nearby homes flooded due, in part, to the dam's limited ability to regulate water flow. Another key factor was that sand mines on the West Fork of the San Jacinto River breached, as they had done multiple times before. Over the years, the sand flowed downstream, shallowing the river and lake, which had no dredging program to maintain their depths. Retired geologist Tim Garfield found the sand created mouth bars, accumulations of sediment that inhibit water flow into the lake, causing water to back up and flood Kingwood neighborhoods.¹⁰



Sand washing down the San Jacinto River created a mouth bar. The channel has accumulated up to 16 feet of sediment since the Lake Houston dam was built.

Photo courtesy of Bob Rehak and reduceflooding.com.

John Barr, a Kingwood resident since 1990 and professor at Lone Star College-Kingwood, felt Harvey's effects at every turn. He and his wife watched water climb four feet, before entering their home and forcing them to evacuate. Additionally, seven of the nine buildings at Lone Star flooded, preventing Barr from reaching his office. Many of his colleagues, he recalled, "lost everything they owned, their files, mementos, valuable equipment." He felt a similar loss when he learned Kingwood High School, where he taught for many years, had five feet of water that destroyed much of his legacy there and did \$63 million in damage to the campus.¹¹

In response to the disaster, flood control projects underway included a \$47 million allotment to update the dam gates and an ongoing dredging project to remove the mouth bar and deepen the river.¹² Area residents hope these improvements will be completed in time to prevent future flooding.

WEST AND NORTHWEST HOUSTON

Once absorbing significant runoff from storms, large swaths of former prairie lands west of Houston are now covered in concrete, preventing water absorption and increasing flooding. At the headwaters of Buffalo Bayou, the Katy Prairie has shrunk from its original estimate between 500,000 and 750,000 acres to its current 20,000 legally protected acres. Development in the area, while economically attractive, has yielded problematic results. West Houston also contains Addicks and Barker Reservoirs, drainage basins created in



West Houston was severely flooded by Harvey, but a small American flag remained to remind residents that all was not lost and that Houston would remain strong. Photo courtesy of Revolution Messaging, Flickr.*

the 1940s to prevent flooding downstream along Buffalo Bayou. Although the reservoirs initially reduced bayou flooding, they now struggle after seventy years of development around them. During Hurricane Harvey, the pools reached elevations of 109.10 feet at Addicks and 101.56 at Barker, spilling into the surrounding neighborhoods, where over 10,000 homes are estimated to have flooded.¹³

Farther into upper Buffalo Bayou and Cane Island Branch, widespread flooding poured into the city of Katy, including homes that had never flooded before. Jane Wong and her family moved their furniture upstairs, but, after a foot of water “started coming in through the drain ... the walls ... and the floorboards,” they had to evacuate. Like many in West Houston, they discovered that their ninety-nine-house neighborhood “wasn’t meant to be developed” as it sat within an area of the reservoir that was intended to accommodate overflow. Homeowners in Wong’s neighborhood and farther upstream filed a lawsuit against the U.S. Army Corps of Engineers, which is responsible for impounding the water behind the reservoirs. On December 17, 2019, Senior Judge Charles Lettow ruled the Corps’s actions were liable for compensation.¹⁴

Despite the widespread discontent with spillage from the Addicks and Barker Dams, renovations to both have been in development by the Corps of Engineers since 2015. By 2019, it had nearly completed its \$75-million project to replace the dams’ gates. This will help ease pressure on the dams during flooding events; however, longer-term flood mitigation projects remain under consideration.¹⁵



The reflection pool at the San Jacinto Monument in La Porte along the Houston Ship Channel shows the extent of flooding from Harvey.

Photos courtesy of EarthCam.

LA PORTE

Recording the highest total rainfall in the Houston area with about forty inches, La Porte recorded 890 inundated homes. Located near the Little Cedar Bayou, Clear Creek watershed, Armand Bayou watershed, San Jacinto River, and Galveston Bay, La Porte is particularly susceptible to flooding. For lifetime resident Rhonda Davis, the “nightmare” began on the first morning of the hurricane. Her home flooded, and, though the water quickly receded, she lost much of her furniture to a horrendous smell. A year later, she still felt the “wrath of Harvey” when, for the first time, she had to have an exterminator come to her house due to an overwhelming number of bugs.¹⁶

In addition to residents’ immediate challenges, La Porte issued a shelter-in-place alert on August 28 due to a hydrogen chloride gas leak at Williams Midstream Services, Inc. Storm damage frequently compromises area plants, and this was one of eighty-nine similar incidents investigated in the Houston area, including a loss of refrigeration at the Arkema facility in Crosby resulting in a fire and a roof collapse at Baytown’s ExxonMobil facility.¹⁷

Despite the onslaught of issues faced in La Porte, Rhonda Davis believes the city “did a marvelous job.” The city’s app effectively allowed residents to receive alerts related to their unique circumstance, like those concerning the chemical leak, and in the aftermath, they had many opportunities “for volunteering, for donations ... and [for] helping people recuperate.” Davis concluded, “The relationships built because of [Hurricane Harvey] are going to be there now forever.”¹⁸

Just like the many storms that preceded it, Hurricane Harvey serves as a reminder of the destruction that weather can inflict on Houston’s communities. Every neighborhood in our 637-square-mile city faced its own challenges in returning to “normal” after this catastrophic event. Although flood mitigation efforts are underway, no regional strategy to control development appears to be in the works, leaving Houston’s neighborhoods nervous to see what the future holds.

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