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WEATHERED HISTORY: GALVESTON AND EXTREME EVENTS

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Texas had seen rain before, plenty. It had flooded before, many times. But on 25 August 2017, Hurricane Harvey dumped a volume of water never before contemplated. The storm had become wedged between two weather systems, one trying to push north, the other south. At landfall, it was 450 kilometers in diameter, with 209 kilometer-per-hour winds. Its circulation, extending well out over the Gulf of Mexico, brought a continual flow of moisture. When Harvey stalled out over the Houston-Galveston area for four days, it dropped 60 centimeters of rain in the first 24 hours in certain areas. Due to the region's vast expanses of impermeable roads, parking lots, sidewalks, and rooftops, all built on a flat coastal plain, there was no place for the water to go for days. At the storm's peak, one-third of Houston was underwater, and at least 68 people in Texas died from the direct effects of the storm.



Men working near an overturned house after the Great Storm. © 1900 Henry H. Morris. Courtesy of the Rosenberg Library Galveston, Texas. All rights reserved. This image has been cropped.

A century earlier, on 8 September 1900, another hurricane, called simply "The Great Storm," hit the area, flooding much of the island city of Galveston. This storm killed approximately 6,000 people, by some estimates as many as 12,000. About 3,600 homes were destroyed, along with commercial buildings and infrastructure—all told, one-third of the city. Winds piled up water from north and south, creating a surge of 4.5 meters. In 1900, the highest point on the island was less than 2.7 meters, down from an earlier recorded height of 3.6 meters due to sand mining. The recorded high-water mark of the storm was 4.8 meters. Many houses were simply swept from their foundations. It was, by most measures, the worst natural disaster in US history.



Harvey. © NASA. All rights reserved.

In between the Great Storm and Harvey, a much slower event occurred: Brownwood. While there was little drama and it garnered few headlines, it may be the most consequential of the three events, signaling the future of Galveston and other coastal areas more clearly than hurricanes and floods. Brownwood was an upper-class housing subdivision built in 1938 on a peninsula in Galveston Bay, not far from a giant oil refinery in Baytown. Designed and constructed by executives from what became ExxonMobil, it was “isolated from the nearby city with comfortable wooded lots boarding the bay,” according to a local hydrologist.¹ If the refinery and office buildings were heavy on steel and concrete, Brownwood was natural. Encompassed by water and home to lush vegetation and wildlife, it was an idyllic retreat after a day’s work. Because the subdivision was on a peninsula, all residents were effectively “living on the bay,” a status symbol both then and now. Here, there were nature trails and boat ramps and breezes. It was the perfect sanctuary—that is, until Brownwood began to sink, and flood, repeatedly.

In the early years, Brownwood, with some 500 residences, was roughly 3 meters above sea level. Forty years later, it had subsided to some 2.5 meters. The usual measures were taken—roads elevated, seawalls and bulkheads built, sandbags stacked, homes put on stilts, pumps installed, and, from 1961 to 1983, about two dozen evacuations conducted. Some residents moved further inland or away entirely. Brownwood became the first place eligible for federal flood insurance.²



Brownwood. Courtesy of US Geological Survey, Department of the Interior/USGS. [Public domain](#).

But flooding, while certainly a function of rainfall and storm surge, was largely a product of human-induced subsidence. “Extensive subsidence,” write two geologists, “caused mainly by groundwater pumping but also by oil and gas extraction, has increased the frequency of flooding.” More specifically, “as much as 3 meters of subsidence has shifted the position of the coastline...”³ But eventually the coastline pushes back: rivers, aquifers, and embayments find their natural settling points. And all this without considering climate change.

What, then, is the significance of these three extreme events in a region I call

“Galveston”? What do these events reveal about the past and signal about the future, a future shifting away from fossil fuels and experiencing declining availability of natural resources and waste sinks? “Galveston” is my shorthand for a spatial area in Texas in the United States, currently marked by industrialism and expansionism, and a temporal period that I expect, in the far future, will be seen as ephemeral. Geographically, Galveston begins with Galveston Island at the intersection of land and sea and spreads northward and upstream through Galveston Bay and its freshwater tributaries across the low-lying coastal plain, now dominated by the city of Houston.

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My temporal and social lens, though, is larger. It goes back to pre-European native peoples and their ways of living with the land, most notably with water in all its forms—ocean, bay, lagoon, river, and bayous—and all its vicissitudes, whether as storm surge and rain bomb, surface flow and groundwater flow. Through this geographic, social, and long-term temporal lens, Galveston allows for the possibility that, eventually, its peoples will adapt to this watery realm, not adapt defensively against it. They will take their cues not from a black liquid underground, or from money in the bank, but from aboveground rain bombs and storm-water surges, from land that sinks and water sources that salinate, from fish and shrimp and timber that can sustain a population when not abused.

In short, the central question in the twenty-first century is how Harvey in 2017, the Great Storm of Galveston in 1900, and Brownwood through much of the twentieth century all punctuate a long historical pattern and, at the same time, portend a future. One answer is that they seem to have interrupted the grand plans of boosterism, highlighting the geological and meteorological precarity of modern living—especially on a barrier island, but further up the bay too. The three events punctured a dream of conquering nature, a notion that still resonates as the twentieth century, defined by a seeming abundance of resources and perceived endless waste sinks, has come to a begrudging end. Another answer is that they position humans in an ecological pattern, at once migratory and settled.

To research Galveston, I had no choice but to drive, and drive and drive. No place I have been is as car-centric as Houston. I drove to Galveston Island to see the seawall and the port and to try to imagine giant waves and a storm surge engulfing this narrow sandy spit a century ago. I drove to Baytown to see the massive ExxonMobil petrochemical complex and a soggy peninsula where an entire neighborhood, Brownwood, sank into the bay. I drove along the bay and the Houston Ship

Channel, a key piece of infrastructure in Houston's century of rapid growth, along with, of course, lucky strikes in oil fields near and far.⁴ And I toured the ExxonMobil office complex, virtually a city in itself, north of Houston, near the Woodlands—an exclusive housing subdivision built, like Brownwood, by Exxon-affiliated developers—and away from the worst flooding and subsidence. Upon reflection, I had two simultaneous and conflicting sensations: I cannot imagine this place getting on a sustainable path; and, this place cannot last, not like this or anything close to it. But if, or when, it does change, it could well follow paths revealed by its extreme events.

The story of "Galveston" is conventionally told as one of pioneering and industrializing: in short, westward economic growth. As Houston petroleum historian Joseph Pratt puts it, "'opportunity' and 'expansion' early on became the central tenets of Houston's religion of boosterism. Whatever it took to foster economic growth in the region would be done."⁵ "Galveston" has always been a nexus of new frontiers, creating prosperity out of barrier islands and inland bays, underground minerals, powerful technologies, and space flights. From the perspective of natural resource consumption and human ecological adaptation, though, "Galveston" is a story of migration. This story has involved the elimination of the area's earliest inhabitants, or First Peoples, the enslavement of kidnapped African peoples, and the mining of water, sand, oil, and gas, which has resulted in the submerging of coastal lands like Brownwood. And the migration is not yet complete.

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First Peoples arrived centuries ago, maybe millennia ago,⁶ followed by a wave of people, mostly of European ancestry, Second Peoples. Upon contact, the two groups traded for a time, but First Peoples' extractive mode became a subordinate strategy to Second Peoples' extractive mode. Hunting, fishing, and gathering according to seasonal availability and conducive weather were replaced by year-round settlement, the clearing of land, the draining of wetlands, the channeling of rivers, and the growing of export crops like cotton and sugar to sell to distant markets. First Peoples return year after year; Second Peoples extract until yields diminish and then move on.

Both modes are adaptive, but only the first can be sustained in place over the long term. In Galveston, that adaptation meant the displacement of First Peoples, where Second Peoples established themselves for maximum wealth generation. For that, Galveston Island was the obvious place to build a port: ideally located at the juncture of sea and land, and yet, being on the bay side of the island, protected from the ocean. Boosterist visions promised boom times ahead. Indeed, Galveston became the most populous city in Texas until nearly the end of the nineteenth century and for a time was the world's largest cotton-shipping port.

Then nature stepped in, shattering this vision. The 1900 Great Storm was a surprise to those whose dreams were based on truly well-protected ports like New York City and London. The Great Storm could have been a day of reckoning. Galveston, a low, sandy barrier island prone to shifting with storms and ocean currents, was no place to build a permanent settlement.



Debris near houses after the Great Storm of 1900. © 1900 Henry H. Morris. Courtesy of the Rosenberg Library Galveston, Texas. All rights reserved.

The lesson of the Great Storm for First Peoples was likely a confirmation of what they had known and passed down for generations—that the island and bay are bounteous places, but they can be deadly as well. Visit, even camp there for short periods, but do not stay, especially in late summer and early fall. The lesson for Second Peoples was different: rebuild for some, migrate further inland for others. The upper bay may not be ideal, but at least it is better protected—with precautions, a permanent year-round settlement is possible. Little could they have known, in the nineteenth century, that this frontier mode could be continued for another century and more with underground extraction. And little could they have known that, like so many migrations, each phase is only temporary, each place, from Galveston Island to the uplands, only a way station until people learn to live in their place, until the economy matures past mere extraction.

And so, Second Peoples settled, as pioneers do. Their resource mode remained extraction. At first, before the Great Storm, they extracted the usual frontier items that could be commodified and sold to markets as far away as New York, even Europe: furs, hides, timber, fish. Then they cleared land and enslaved people to raise commodity crops, especially cotton and sugar. “Both before and after oil,” Pratt writes, “the transportation and processing of raw materials for export constituted the engine of growth” for the “Galveston” area. What is more, the “emphasis [was] on harvesting resources as rapidly as possible with no concern for the long-term depletion of these resources.”⁷ It was a frontier-style extraction that continues to this day.

Pratt poses the essential question: What would have happened “had oil not been discovered near Houston”? Asking this question allows us to use history to imagine a twenty-first-century transition after fossil fuel dependency. If oil had not been found 130 kilometers east of Houston at Spindletop,

that might have been the end of the story. Or, as the editors of *Fortune* magazine put it in 1939, "Without oil Houston would have been just another cotton town."⁸

To extend this imaginative rewrite of history, Second Peoples, situated inland, would have migrated seasonably into the bay all the way to Galveston Island to fish, hunt, and collect vegetation. They would have adapted to "Galveston" much as the First Peoples did. In fact, if the history of fire adaptation in North America is any guide, Second Peoples would have learned such a resource mode from the First Peoples. "The evidence suggests that early European colonists were generally ignorant (or in denial) of wildland fire and of methods to control it," writes fire historian Stephen J. Pyne. "It was from the Indian—into whose fire environment they moved—that the European immigrants learned basic survival skills."⁹

Only now are some people beginning to entertain the idea that they can learn from history and the adaptations of early peoples.

Likewise, the evidence from Galveston suggests that nineteenth-century colonizers were ignorant of the effects of extreme weather on a coastal barrier island. Even after the Great Storm, they retained that ignorance (or denial) right into the twentieth century, buoyed by boosterist calls for greatness and the belief that all could be controlled. Only now are some people beginning to entertain the idea that they can learn from history and the adaptations of early peoples.

How might it have been if settlers had actually aspired to adapt to the environment, not shape it to their desires and ambitions? Things might have been different before and especially after the Great Storm. But this did not happen. Oil transformed the region, as it does wherever it is discovered. Oil is the quintessential environmental signal that says, as positive feedback in the form of power and wealth kicks in, *extract more*. When nearby fields played out, "Galveston" extended its extractive reach, both physical and technological, across the state, the region, and, eventually, proclaimed itself the "Oil Capital of the World," not just for the extracting and refining that took place there, but for the expertise developed that could be applied anywhere in the world.

"Anywhere" became the operative geographic term for "Galveston" in the twentieth century, which was no longer grounded in a particular place. Like so many cosmopolitan centers, it could power its way out of the constrictions of limited port capacity (with dredging and channelization), out of its otherwise backwater location (first with railroads, then with highways and airports), out of seasonably limited freshwater (with reservoirs), out of the heat (with air conditioning). Oil was global. It came out of the ground all over the world and was marketed all over the world. "Energy made in America is not as important as energy simply made wherever it is most economic," said a CEO of ExxonMobil.¹⁰ And if the place does not matter, then the water and the soil, the hurricanes and rain bombs do not matter. New resources can always be procured from some other place; extreme events can always be defended against or endured.

The transformation brought about by oil in twentieth-century Houston is far more than demographic and economic. It is an extension of the frontier. Behaviorally and institutionally, it is the prolongation of the last stage of a boom that, as in all mining operations, eventually turns to bust. Economically, it is the perpetuation of an extractive economy. Politically, it is the grasping for power that empires always do, both in their ascent and in their decline. Ultimately, though, nature bats last. It asserts the placefulness of the denizens of a particular locale, regardless of financial gain, economic, or political power, let alone the physical power of energetically dense fuels.



Texas Oil Refinery. © Art Wager on iStock. All rights reserved.

“Galveston’s” oil-and-gas rush consumed the region. It consumed freshwater supplies, causing the land to subside, and, in turn, consumed an oil field and a neighborhood. It consumed land and water with its toxic dumping as well as the climate-stabilizing components of the atmosphere and oceans. Maybe, one day in the not-too-distant future, it will also consume the “pioneering spirit”—what for many peoples has been a colonizing spirit and, for future generations, a depleting spirit.

“Galveston” is only a microcosm of a world addicted to oil. In a world organized as if endless material expansion on a finite planet is possible, it may be a harbinger of what is to come. When the low-cost production runs out, when the amount extracted no longer justifies the energy and capital needed to get it, when the bill for true costs—costs to the land and water locally, and to the climate system globally—comes due, as the story suggests, boom times will be over, and the migration, delayed for a century, will resume.

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What might that resumed migration look like? We can only speculate, but such is the method of a futurist exercise: Many of Houston’s occupants will emigrate as an economy grossly propped up by near costless fossil fuels winds down. Just as Galveston Island is propped up physically and economically, “Galveston,” the region, the cultural area, the economic engine, is propped up by its own unsustainable physical systems. Those who remain will adapt to a diminished landscape, or move on.

But, in a world full of human activity and impact, moving on cannot preclude adapting, eventually. Significantly, adapting is not installing bigger pumps, better filters, and moving water to suit—what I term defensive adaptation. Rather, adapting is adjusting to the environment, to what nature has given and humans have altered. Here, *adapting to* is the response to a century and more of *domination of*, which surplus-seeking, expansionist societies, especially fossil-fueled societies, have been able to avoid for a couple of centuries.

The twentieth-century modes are no longer tenable, not if living in “Galveston” for the indefinite future is the goal. If, however, the goal is to extract every last bit of wealth, “Galveston” will continue for some time to come. And then it will collapse. If the financial signals are not enough, the natural ones will be, eventually, whether they appear as an even greater Great Storm, another, more severe, rain bomb, an ice storm, a heat wave that exceeds designed tolerances for temperature, or simply the slow sinking of the land compounded by sea-level rise. The alternative, of course, is to adapt in place.

This article is adapted from a chapter in Princen’s forthcoming book, *Fire and Flood: Extreme Events and Social Change, Past, Present, Future* (Cambridge, MA: MIT Press).

¹ J. C. Holzschuh, “Field Trip Guidebook: Land Subsidence in Houston, Texas, USA,” Fourth International Symposium on Land Subsidence, 12–17 May 1991, Houston, Texas.

² Laura Bernal, “Brownwood: Baytown’s Most Historic Neighborhood” (master’s thesis, University of Houston, May 2020), 104.

³ Laura S. Coplin and Devin Galloway, “Houston-Galveston, Texas: Managing Coastal Subsidence,” US Geological Survey, 1999, 35–48, p. 35.

⁴ In fact, the Houston Ship Channel was just a dream of Houston boosters in the nineteenth century. Only in 1909, after the Great Storm of 1900, was a plan developed and, eventually, federal funds procured. Holzschuh, “Land Subsidence in Houston, Texas.”

⁵ Joseph A. Pratt, “A Mixed Blessing: Energy, Economic Growth, and Houston’s Environment,” in *Energy Metropolis: An Environmental History of Houston and the Gulf Coast*, eds. Martin V. Melosi and Joseph A. Pratt (Pittsburgh, PA: University of Pittsburgh Press, 2007), 21–51, p. 24.

⁶ William J. Newcomb, Jr., “Atakapans and Neighboring Groups,” in *Handbook of North American Indians*, ed. William C. Sturtevant, vols. 14–15 (Washington, DC: Smithsonian Institution, 1978–), 659–63.

⁷ Pratt, “A Mixed Blessing,” 25.

⁸ “Texas,” *Fortune*, December 1939, 85–91, 162, cited in Joe R. Feagin, “The Global Context of Metropolitan Growth: Houston and the Oil Industry,” *American Journal of Sociology* 90, no. 6 (1985): 1204–30, p. 1214.

⁹ Stephen J. Pyne, *Fire in America: A Cultural History of Wildland and Rural Fire* (Princeton, NJ: Princeton University Press, 1982), 78.

¹⁰ Rex Tillerson, quoted in Steve Coll, *Private Empire: ExxonMobil and American Power* (New York: Penguin Books, 2012), 239.



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