

A Layman's Guide To Houston After Harvey: Don't Throw The Opportunity Baby Out With The Stormwater Wendell Cox and Tory Gattis

In the aftermath of Hurricane Harvey, and the disastrous flooding, Houston has come under extreme scrutiny. Some in the global, national ¹as well as local ² media assaulted the area's flood control system and its development model, criticisms that were echoed by some in the local area.

Much of the current debate starts from a firm misunderstanding of the region's realities. This could lead to policies that ultimately undermine the keys that have propelled the region's success. Below is a primer to inform future discussions of Houston's future trajectory.

Did Harvey reflect Houston's failure or a remarkable resiliency?

Harvey was a remarkable event for which there is little precedent. The Harris County Flood Control District estimates the four-day rainfall from Hurricane Harvey to be a once in 500 to 40,000 year flooding event³. Whether such events are more likely in the future, the region's systems worked remarkably well, although they should be bolstered considerably in the future.

Harvey's attack was beyond any design engineering standards, and yet no levee failed and no dams were breached – an impressive yet under-heralded accomplishment. Based on assessments by the National Weather Service and analyses by various meteorologists, Harvey rained down more water on a metro area than any storm in U.S. history. The estimated 34 trillion gallons of rainfall across East Texas and western Louisiana is about the same as Tropical Storm Allison in 2001, 2015's Memorial Day floods and last year's Tax Day floods - combined.⁴

To be sure, the storm had tragic results, but it surely could have been far worse. There were 82 total deaths from Harvey, of which 35 were in Harris County⁵. In comparison, 1,836 died from Hurricane Katrina. Seventy two thousand single-family homes were damaged or destroyed, about 5% of 1.5 million homes in the region.⁶ Two thousand two hundred apartments were damaged or destroyed, only 0.3% of inventory⁷ according to the Texas Department of Public Safety (DPS). Another survey by Apartment Data Services of 80% of area apartment complexes found 9,882 damaged units, a rate less than 2%⁸. Forty of 1,200 (3.3%) office buildings suffered damage.⁹ And, 300,000 vehicles were damaged.¹⁰

Much media attention has been to the flooded streets. Yet it is rarely noted that Houston streets are designed as last-resort water detention ponds,¹¹, and in fact, although 30% of Harris County was underwater at some point during Harvey,¹² less than 5% of homes were damaged.¹³

This is not to minimize the tragic losses for thousands of people, and the even more tragic loss of life. It also does not underestimate the economic impact of the storm, with an estimated \$97 billion in economic losses, the second-most expensive storm in American history after Katrina.¹⁴ But in context, Houston has shown remarkable resilience in the face of widespread devastation from an unprecedented flooding event.¹⁵

Were Houston's land use regulations to blame for the extent of the disaster?

Much of the blame in the national and international media was directed at the region's land use regulations, among the most liberal of any major MSA in the nation.

The city of Houston is the largest municipality in the nation without zoning. As a result, the city provides a wide array of housing development alternatives, including the high-rise multi-family buildings that are so favored in the urban planning community.

For decades, urban planners have criticized Houston's liberal land use regulations. This criticism was heightened in the aftermath of Hurricane Harvey, during which some analysts blamed liberal land use regulations for the flooding. As Leo Linbeck III, Vice Chairman, of the Center for Opportunity Urbanism, indicated, "They believe in a top-down, expert-driven technocracy that rewards current real estate owners by actions that restrict new supply, raise property value (and therefore taxes), stifle opportunity and undermine human agency."¹⁶

However, others appropriately noted that the scale of the rainfall was so much beyond any reasonably anticipated level that land use regulation was simply not an issue.¹⁷ Houston, despite assertions of the "wild west" nature of its development, has many areas that are zoned. Sugarland, Pearland and Lake Jackson zone, while others, such as Pasadena and Conroe, do not.

Counties do not have zoning authority in Texas. As a result, and as in the city, high-rise development is possible, though there is limited demand for such product. These unincorporated areas have nearly 1,000 municipal utility districts (MUDs),¹⁸ established under state law to provide utility and other services to new housing developments. Much of the new housing development (more than 75%) occurs in MUDs. MUDs play an important role in preserving housing affordability and keeping public service costs low in expanding suburban areas. In MUDS, developers fund the up-front infrastructure costs, and are repaid through bonds issued by the MUD financed by property taxes from the property owners.

Would zoning and traditional controls have sheltered Houston from Harvey's biblical proportion rains? As *The Wall Street Journal* put it: "New York City has plenty of zoning and building limits, yet it suffered \$19 billion in damage from Hurricane Sandy that dropped only a half inch of rain. Fifty-one square miles of New York were flooded by Sandy's storm surge, 300,000 homes and 23,400 businesses were inundated. "Smart growth" plans didn't prevent that."¹⁹ These estimates exclude the much larger impacted area, with more people, in the suburbs of New York.

Higher density and zoning, as the punditry suggest, does not guarantee a resilient infrastructure. New Orleans before Katrina was both dense and zoned, but that did not protect the city from devastation. Irma did considerable damage around residential towers and in downtown Miami. Indeed as Houston Mayor Sylvester Turner put it aptly: Zoning wouldn't have changed anything. We would have been a city with zoning that flooded."²⁰

Possible and sustainable solutions to Houston's flooding problem

It is imperative, of course, that Houston address its persistent --- and long lasting --- propensity to flood, after this unprecedented and unforeseeable event.

Days after Hurricane Harvey hit, Quartz opined, "Houston's flooding shows what happens when you ignore science and let developers run rampan.²² It is often maintained that both recent development and climate have worsened these conditions, ²² but Houston has a long history of significant flooding going back to its founding in the early 1800s,²³ well before any significant development or sprawl. This is not to minimize the potential risks, but to understand the nature of the problem. At the same time, whatever the global reaction to climate change, it is unlikely that anything that we do in the short or even medium term will make much of a difference. It makes sense to find ways to gradually reduce greenhouse gases, but the ultimate international agreement, the Paris Agreement (Paris Accords) is unlikely to make much impact on the actual climate in the near or mid-term, a view held by experts from Bjorn Lomborg²⁴ to James Hansen/²⁵

Our immediate focus should be on resiliency. Hurricanes are part of reality along the Gulf of Mexico and South Atlantic. Our suggestion is that the approach to remedying Houston's flood problems should not be based on hysteria or trying to assign blame but on boosting resiliency which means placing primary attention on stronger defenses against catastrophic events.

Commonsense responses to Harvey

One common response to Harvey in the media has been to call for an end of all development in the floodplains. It is important to note that developers building in the floodplain are already required to mitigate. This is about the notion that Houston has created a massive concrete basin with little open space. Houston has more acres of parkland and greenspace than any other large city in America, and is third behind San Diego and Dallas in park acreage per capita.²⁶

The notion that setting aside more open space ---itself a good thing --- would have contained Harvey is dubious at best. The "narrative reflexively applied to Houston," as the Henry Grabar in *Strongtowns* has noted, "is too spread out, its infrastructure too expansive for its unproductive tax base to properly maintain, and thus it was woefully unprepared for Hurricane Harvey. It they hadn't built all those parking lots, filled in all those wetlands and insisted on driving everywhere, this wouldn't have been nearly as devastating. That narrative is simple. It's also wrong."²⁷

The problem, Grabar notes, is lacking "a proper sense of scale."²⁸According to research by Texas A&M, between 1992 and 2010 nearly 25,000 acres of wetlands was developed around Houston that would have handled nearly 4 billion gallons of stormwater. That sounds like a lot, but with an estimated 9 trillion gallon rainfall²⁹ (out of 34 trillion gallons across East Texas and western Louisiana³⁰), that's less than 0.05% of the water that fell – it simply would not have helped in any meaningful way. And too high a greenspace requirement would have lead to even more sprawl.³¹

In reality Houston has substantially less impervious surfaces covered by buildings, roads, and parking lots (39.2%) and substantially more absorbent surfaces with trees, grasses, and soils (60.6%) than similarly populated American cities"³² "If Harvey happened in 1850 instead of today," added historian Phil Magness on Facebook, "the results would be nearly identical in terms of land flooded…No zoning law or ban on parking lot construction would ever have 'fixed' anything about that."³³

What lessons and improvements have been implemented from previous floods?

After widespread flooding from Tropical Storm Allison in June of 2001, there was a massive increase in the size of the floodplain. Harris County Flood Control District's Tropical Storm Allison Recovery Project³⁴ (TSARP) used the NASA developed Light Detection and Ranging (LiDAR) laser technology to create the most accurate floodplain maps in the country (automatically updated for all new developments) as well as completely revamped drainage and stormwater runoff detention regulations across the area. Detention ponds are required for all new developments over 10,000 square feet of land area, which is near the national median lot size for new single family houses),³⁵ and electricity cannot be turned on for a development until detention inspections have been passed (and are re-inspected annually). These detention requirements require no net increase in runoff from new developments.

Other retention projects also were developed after Allison. Many of these performed well during Harvey, such as the Willow Waterhole and Arthur Storey Park. These facilities are dual-use, acting as recreational parks and greenspace the vast majority of the year when not holding excess water. The Harris County Flood Control District has spent over \$4 billion on flood control infrastructure, and spends another \$100 million each year.³⁶

The Texas Medical Center, the world's largest medical complex, took significant flooding damage during Allison. But improvements were made afterward³⁷including warning systems, pumps, elevated electrical equipment, and floodgates and doors ³⁸ that prevented flooding damage during Harvey; a sterling example that Houston knows how to learn lessons from disasters and implement fixes.

Some efforts since Allison have not been as successful. Project Braes to reduce the Braes Bayou floodplain has been underfunded and remains uncompleted. Additionally, in 2010 voters approved ReBuild Houston, a new property tax fee to improve streets and drainage infrastructure, but this program has been temporarily suspended due to ballot language lawsuits.

Does Houston sprawl more than other American urban areas?

The claim that Houston is particularly "sprawling" and that this exacerbates flooding is not supported by the facts. Urban sprawl is the spatial (geographic) measure of urbanization relative to the population. It is best indicated by urban population density. The only authoritative source for urban population density is the U.S. Census Bureau, which defines urban areas by principally applying density criteria to smallest census enumeration areas (census "blocks").³⁹ There are 124,000 census blocks in the Houston MSA, with an average population of 48.

All cities⁴⁰ sprawl - that is as they grow in population as they spread out. That is an important message of the new international *Atlas of Urban Expansion*, which has been jointly published by United Nations Habitat, New York University and the Lincoln Institute of Land Policy.⁴¹ This has largely resulted from increased affluence and urban transportation technologies (principally the car) that make it possible to travel farther in a certain period of time.

Indeed, among the major US MSAs (those over 1,000,000 population), 85% of the population now lives in lower density, automobile-oriented suburban and exurban areas, while only 15% live in dense, transit and walking oriented urban cores.⁴² Most major MSAs (34 of 53), including Houston, do not have large historic urban cores and, as a result more than 90% of their population is in post-World War II automobile oriented suburban areas. In all but one of the 53 MSAs (New York), at least 60% of residents live in automobile oriented suburban and exurban areas.⁴³

Daniel Herriges at *Strong Towns* respond to the post-hurricane criticisms, noting, "Houston's suburbs are largely indistinguishable from the suburbs of any American city."⁴⁴ Indeed, the automobile oriented suburban areas of Houston are 18% denser than the major metropolitan average and 9% denser than similar communities in New York.⁴⁵

In 2010, the Houston region ranked as the 18th *densest* among the 41 urban areas with more than 1,000,000 population. Houston was a quarter denser than Boston, which is often thought of as a dense urban area, 14% denser than Austin and 8% denser than Philadelphia. Houston's density was approximately equal to that of Seattle and only 18% less dense that Portland, which has an international reputation as a Mecca for densification. Houston is far denser that some other large urban areas, 74% denser than Atlanta, 77% denser than Charlotte and 66% denser than Hartford.

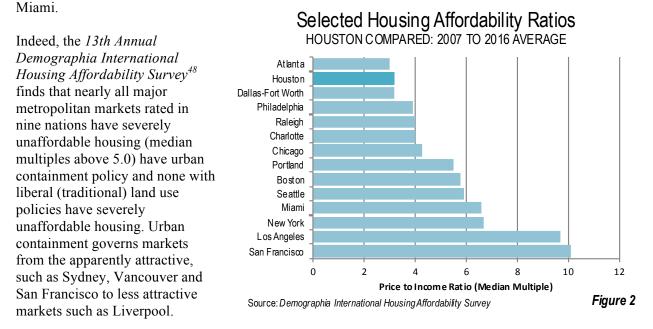
Moreover, between 2010 and 2016, the Census Bureau's Selected Urban Area Population Density American Community Survey HOUSTON COMPARED: 2010 estimated that the population density of the Houston urban Los Angeles area as defined in 2010 increased San Francisco New York 13.4%. This is the largest density Miami increase among the 23 urban Portland areas with more than 2 million Chicago population. By comparison, Seattle Portland experienced an increase Houston nearly one-third less, at 9.6%.⁴⁶ Dallas-Fort Worth Philadelphia Boston Thus, Houston's urban "sprawl" Raleigh is about average for the US, and Atlanta the latest data indicates than it is Charlotte densifying faster than urban 0 2.000 4.000 6,000 8,000 areas that have strong Population Density (per Square Mile) densification policies. Figure 1 Source: 2010 Census

How does Houston's land regulation system contribute to housing affordability?

Houston's liberal land use regulations have led to some of the best housing affordability in the nation, as measured by price to income ratios. Over the past 10 years, the "median multiple" (median house price divided by median household income) has averaged 3.2 in Houston. Other regulated but liberal markets continue to have median multiples under 3.5 (Figure 2).

These housing affordability measures are slightly above the median multiples that characterized today's major MSA markets until 1970, including all markets in California. Only two of these 51 markets had median multiples over 3.0 (New York and New Orleans, both 3.2) from 1949 to 1969.

Starting in the 1970s, land use regulations were significantly strengthened and house prices increased materially relative to incomes. A number of markets adopted urban containment policy. The effects are most obvious in coastal California, where the median multiples over the past decade have averaged from 9.0 to over 10.0.⁴⁷ Other urban containment markets have seen their median multiples rise to more than 5.0, such as Seattle, Portland, and



Why is Houston's (and the nation's) middle-class at risk?

There is rising concern about the decline of the middle-class and increasing inequality. Much of this has been attributed to rising house prices.⁴⁹

Housing costs are the largest element of household budgets. Unnecessarily driving housing costs higher would reduce the affluence of the middle class in the years to come. For example, a household having to spend two or three times as much on housing will have less discretionary income to spend on other goods and services or for savings. Moreover, higher house prices reduce the ability of local authorities to address the problem of affordable housing for low-income households, since affordability is defined by the market price of housing.

Further, there is a strong relationship between the cost of living and the cost of housing. Among the MSAs with 5% or higher costs of living compared to the average, 70% of the difference is attributable to housing costs. Moreover, Houston has a high standard of living, which was estimated at 20% higher than San Francisco in 2015, despite San Francisco's more than 30% higher pay per job.⁵⁰ The difference exists largely as the result of San Francisco's much higher housing costs.

In fact, the adoption of an urban containment or densification agenda would likely lead to seriously diminished housing affordability as it has in other housing markets.

The Houston land use regulation model has particular advantages to deal with the expense of expanding urban services around the nation's MSAs. Houston's MUDs have been effective in making it possible for new, greenfield suburban infrastructure to be financed efficiently and to be paid for by new residents, rather than by the general tax base.

There is an imperative to prevent any further spread of urban containment or densification policy because of its negative economic impacts on the affluence and poverty households.

The Answer: Maintaining the Houston Model by making it more resilient

In our attempts to find practicable solutions to Houston's problem, it is critical not to throw out our successful development model with the stormwater. Fundamentally, there was virtually no connection between the storm and its damage and the area's successful land use regulation.

The most important issue going forward is flood control, which requires systems that bolster resiliency. An effort to build resiliency is an issue not just for Houston but also for many communities in vulnerable coastal areas that have become home to a growing number of Americans over the past half-century.⁵¹

Great cities build themselves around resiliency. The Netherlands, the great incubator of the modern capitalist city, has been waging a mostly successful battle against rises in sea levels for several hundred years. The prosperity of drought-plagued California depends on massive transfers of water from our mountain ranges. Even in impoverished Bangladesh, better drainage and preparedness has reduced deaths and damage from flooding compared to the past.⁵²

As we have shown above, Houston has a history, and the resources, to plan for potential disaster --- the essence of resiliency. But these efforts cannot, and practicably will not likely be implemented, if Houston abandons its traditional pro-growth attitudes that have been so critical to its emergence as America's great "opportunity city". Any changes need to be calibrated against its potential impact on housing affordability, long a Houston strength, and economic growth, which also will be necessary to fund future infrastructure improvements.

Urban resiliency requires two things: an ability to learn from experience and, according to Northeastern University's resiliency expert Daniel Aldrich, a commitment on the part of its residents to improve their city. The response to Allison, as discussed above, represented learning from experience. In the coming months, we will engage, as many in Houston and elsewhere, to finding appropriate and practical solutions to the legitimate issues raised by Harvey.

As for commitment to the city, the "Houston spirit," as Mayor Turner has suggested, demonstrated how America's most diverse large metropolitan area⁵³ rose to the challenge posed by Harvey. Such grassroots effort may not be a total solution to nature's fury, but, along with adaptive policies by government and business, they represent the critical element in building urban resiliency in an uncertain age.

The way forward is to fully understand what happened and why it happened, consider alternative strategies to mitigate the difficulties without undermining the Houston's area's unique ability to provide opportunity to its residents.

¹ https://www.theatlantic.com/technology/archive/2017/08/why-cities-flood/538251/

² http://www.houstonchronicle.com/local/gray-matters/article/Don-t-blame-Mother-Nature-for-flooding-Blame-7257240.php

³ HCFCD memo 9/5/17, Immediate Report #1, Hurricane Harvey – Storm and Flood Information

⁴ <u>http://www.houstonchronicle.com/news/article/Harvey-will-make-the-history-books-for-nation-s-12201641.php</u>

⁵ The Economy at a Glance, Greater Houston Partnership, Vol. 26 #9, September 2017, http://www.businessinsider.com/deadliest-hurricanes-storm-in-american-history-2016-9

⁶ The Economy at a Glance, Greater Houston Partnership, Vol.26 #9, September 2017,

http://www.houston.org/pdf/research/quickview/Economy_at_a_Glance.pdf

⁷ The Economy at a Glance, Greater Houston Partnership, Vol.26 #9, September 2017

¹² https://www.washingtonpost.com/news/post-nation/wp/2017/08/29/harvey-takes-aim-at-louisiana-as-trump-plansto-survey-stricken-texas/

¹⁴ The Economy at a Glance, Greater Houston Partnership, Vol.26 #9, September 2017

- ¹⁶ http://www.newgeography.com/content/005730-hurricane-harvey-a-view-a-rugged-communitarian
- ¹⁷ See https://www.strongtowns.org/journal/2017/8/30/houston-hurricane-harvey-land-use.
- ¹⁸ http://www.ghba.org/wp-content/uploads/pdf/ghba-forecast-scott-davis-meyers.pdf
- ¹⁹ https://www.wsj.com/articles/texas-thou-hast-sinned-1504221194
- ²⁰ http://www.houstonchronicle.com/opinion/outlook/article/Florida-Rose-Post-Harvey-the-city-must-reset-

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²¹ https://qz.com/1064364/hurricane-harvey-houstons-flooding-made-worse-by-unchecked-urban-development-andwetland-destruction/

- ²² https://www.theguardian.com/commentisfree/2017/sep/11/threat-climate-change-hurricane-harvey-irma-droughts
- ²³ http://www.houstonchronicle.com/local/gray-matters/article/Don-t-blame-sprawl-for-Houston-s-floods-
- 12172004.php ²⁴ https://www.prageru.com/sites/default/files/courses/transcripts/lomborg-
- the_paris_climate_agreement wont change the climate-transcript.pdf
- ²⁵ https://www.ecowatch.com/james-hansen-climate-change-2030724330.html
- ²⁶ http://www.houstonchronicle.com/local/gray-matters/article/Don-t-blame-sprawl-for-Houston-s-floods-

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- ²⁸ https://www.strongtowns.org/journal/2017/8/30/houston
- ²⁹ https://www.citylab.com/envir<u>onment/2017/09/is-houstons-zoning-to-blame/538626/</u>
- ³⁰ http://www.houstonchronicle.com/news/article/Harvey-will-make-the-history-books-for-nation-s-12201641.php
- ³¹ https://www.strongtowns.org/journal/2017/8/30/houston-hurricane-harvey-land-use
- ³² http://dailycaller.com/2017/09/01/houstons-lack-of-zoning-laws-didnt-make-harvey-more-damaging-experts-say/
- and https://www.cato.org/blog/lack-zoning-not-houstons-problem
- ³³ <u>https://marketurbanismreport.com/houston-flood-lack-zoning/</u> ³⁴ <u>https://www.hcfcd.org/storm-center/tropical-storm-allison-2001/tropical-storm-allison-recovery-project//</u>
- ³⁵ In 2016, the median single-family house size (excluding condominiums) was 9.076 square feet.

https://www.census.gov/construction/chars/completed.html

³⁶ http://thehill.com/blogs/pundits-blog/state-local-politics/349021-opinion-dont-blame-houstons-lack-of-zoninglaws-for

³⁷ http://sspeed.rice.edu/sspeed/downloads/October%2027/Presentation2 Penland.pdf

 $\frac{12172507.php}{39}$ Urban area data, both population and land area is updated with each census. The next update will be in the 2020 census. Urban area criteria: https://www2.census.gov/geo/pdfs/reference/fedreg/fedregv76n164.pdf⁴⁰ Dhaka, the world's densest urban area, with an urban density approximately 40 times that of Houston has been

referred to as "sprawling."

- ⁴¹ http://www.lincolninst.edu/publications/other/atlas-urban-expansion-2016-edition.
- ⁴² http://www.newgeography.com/content/005640-us-metropolitan-areas-from-polycentricity-dispersed
- ⁴³ http://www.newgeography.com/content/005640-us-metropolitan-areas-from-polycentricity-dispersed
- ⁴⁴ https://www.strongtowns.org/journal/2017/8/30/houston-hurricane-harvey-land-use

⁸ http://www.houstonchronicle.com/business/real-estate/article/Fewer-flooded-units-than-feared-12202307.php

⁹ The Economy at a Glance, Greater Houston Partnership, Vol.26 #9, September 2017

¹⁰ The Economy at a Glance, Greater Houston Partnership, Vol.26 #9, September 2017

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¹³ The Economy at a Glance, Greater Houston Partnership, Vol.26 #9, September 2017

¹⁵ https://www.spectator.co.uk/2017/09/resilience-not-devastation-is-the-real-story-of-the-texas-floods/

³⁸ http://www.tmc.edu/news/2017/08/despite-hurricane-harvey-tmc-institutions-operational-accessible/ and http://www.houstonchronicle.com/opinion/outlook/article/Bentsen-The-Texas-Medical-Center-defeated-Harvey-12172307.php

⁴⁵ Analysis using the City Sector Model, Despite its large urban core, New York exceeds all MSAs in the population of its automobile oriented suburbs except for Los Angeles.

⁴⁹ Matthew Rognlie (2014). "A Note on Piketty and Diminishing Returns to Capital."

http://www.mit.edu/~mrognlie/piketty_diminishing_returns.pdf.

⁵⁰ Wendell Cox, *The Center for Opportunity Urbanism Standard of Living Index*, 2016,

http://opportunityurbanism.org/wp-content/uploads/2016/10/COU-standard-of-living-index.pdf. This index adjusts the annual pay per job from the Bureau of Labor Statistics using the Bureau of Economic Analysis rent-based regional price parities and the owners cost for a median priced house, weighted by the national owner-occupier to renter ratio.

 ⁵¹ https://www.csmonitor.com/USA/Society/2017/0912/Hurricanes-may-be-getting-bigger-but-death-toll-isshrinking
⁵² https://www.nytimes.com/interactive/2017/06/15/world/europe/climate-change-rotterdam.html?_r=0;

⁵² <u>https://www.nytimes.com/interactive/2017/06/15/world/europe/climate-change-rotterdam.html?_r=0;</u> https://www.wsj.com/amp/articles/the-climate-change-distraction-1504802476?mg=prod/accounts-wsj

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⁴⁶ Calculated from American Community Survey 2016 and 2010 U.S. Census data.

⁴⁷ Los Angeles, San Francisco, San Jose and San Diego.

⁴⁸ http://www.demographia.com/dhi.pdf