Quantifying the Impacts of Extreme Weather Events Across the United States

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Introduction

Weather is generally what you see outside on any particular day. We hear about weather all the time, usually through friends, family, or the media and we even use some weather terms in our daily life even though we may not notice that we do. Terms to describe the weather like cold, cool, hot, and sunny all come naturally to us.

There is also another type of weather called extreme weather. Extreme weather includes unexpected, unusual, unpredictable, severe or unseasonal weather. Often times, extreme weather related events are based on a location's recorded weather history. For example, if it is known that an area in Northern California is prone to wildfires during a specific season, it is very likely that the same event will happen again in that area each time that specific season occurs. Extreme weather and climate events (e.g. heat waves, droughts, heavy rainfall, wildfires) have always posed risks to society. When investigating these extreme events, the public should be prepared under any circumstances as well as become well aware of the possible outcomes that may result from the event.

Objective

The purpose of this study was to examine the different types of extreme weather events and how they have impacted the United States.

These events are direct effects resulting from climate change, which has been the topic of many scientific journals, articles, and published works throughout the last century.

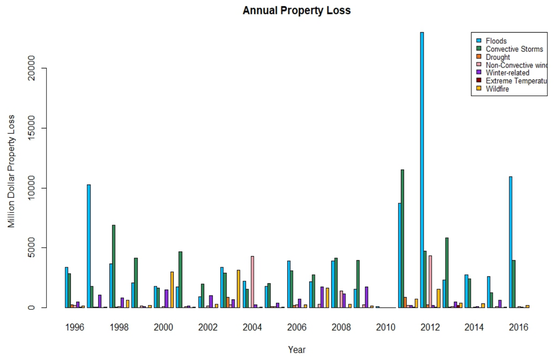
People should be informed about the possible weather events that are currently happening around the world, as well as the chances of a certain weather event or weather events that may take place in their area, especially since many weather phenomena have proved to be unpredictable and severe.

Methods

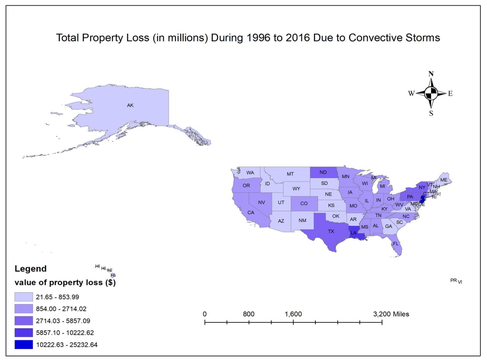
- We analyzed extreme weather, in addition to its occurrence and the effects that is has on property.
- We worked with a collection of data from 1996 to 2016.
- We had to adjust the inflation rate each year, which was calculated based on Consumer Price Index (CPI). CPI is a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services. Because extreme weather events are becoming more and more common, there needs to be a way to classify and group all of these events. This is why knowing exactly what type of weather event is occurring is important.
- We created figures and maps to fully analyze the data and to clearly observe what happened in each year. For the maps, focused on three weather events; convective storms, flood, and wildfire. There are many studies that show the impacts of these three extreme weather events on the United States.
- These major events have subtype events that are groups in different categories. Below is a list of extreme weather events and the categories in which they fall:

Floods: -General flood -Flash flood -Coastal flooding	**Extreme Temperature** -Freeze/Frost -Cold wind chill -Extreme cold/wind chill -High wind -Strong wind
Convective Storms: -Thunderstorm wind -Tornado -Funnel cloud -Hail -Heavy rain	**Non-convective winds** -High wind -Strong wind
Winter-related Storms -Winter storm -Blizzard -Ice storm -Heavy snow	**Drought** *It is in its own category **Wildfire** *It is in its own category

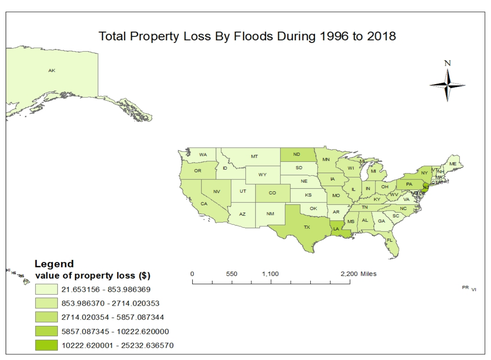
Results



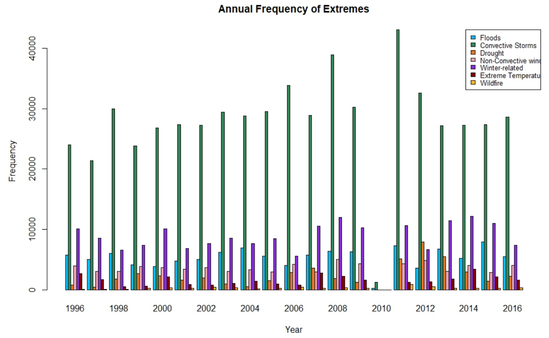
- There is a huge amount of million dollar property loss in 2012, mainly because of floods. An extreme weather event that occurred in that year was Hurricane Sandy, which was the deadliest, most destructive hurricane, and most expensive extreme weather event to recover from in 2012.
- In the United States, Hurricane Sandy primarily affected the East Coast and was most likely added to this data set which could have possibly boosted the million dollar property loss for 2012. Although there are no visible gaps in the data, we noticed that the extreme weather event that occurred the least were droughts, while floods had the most occurrences.



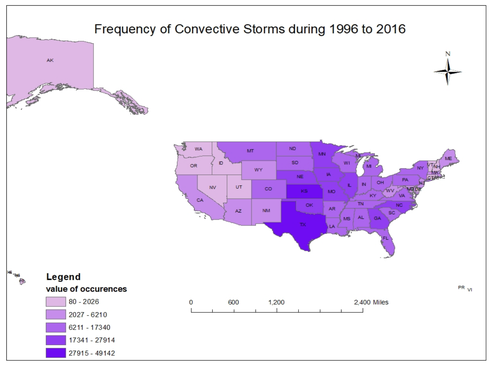
- The states with the most property loss are Texas, Oklahoma, Missouri, and Alabama. Colorado, Kansas, Kentucky, and Minnesota come in second.
- States with the least amount of property loss include Alaska, Oregon, Nevada, New Mexico, Maine, and Montana.



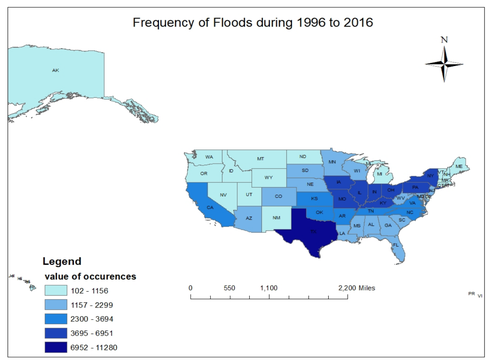
- The property loss is measured in US dollars to show the amount of money loss after this extreme weather event took place. Texas, Pennsylvania, North Dakota, Louisiana, New York, and New Jersey have the most property loss costs due to floods. States including Alaska, Arizona, Washington, and Nebraska have the least property loss due to floods during the 21 year period.



- Though not as sharp as the jump from 2010 to 2011, there is a substantial amount of fluctuation between the years. One major observation that we noticed was that there seemed to be a huge gap for the year 2010. We realized that there was almost no data for that year, being the reason for that largely visible gap.
- The most common extreme weather event is convective storms, while the least common is wildfire. While there were hardly any major extreme weather events that happened in 2010, 2011 had the greatest amount of convective storms than any other year, though the number of occurrences does not remain constant every year. This leads us to believe that having irregularities in the weather throughout the years is

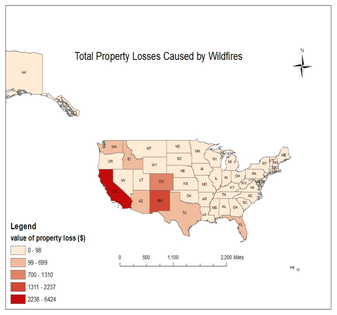


- As shown in the map, the two states that experienced the most convective storms throughout this 21 year time period are Texas and Kansas.
- States including Nebraska, Iowa, Illinois, North Carolina, and Georgia come in second. States with the least amount of occurrences include but are not limited to Oregon, Utah, Idaho, Nevada, and Vermont.

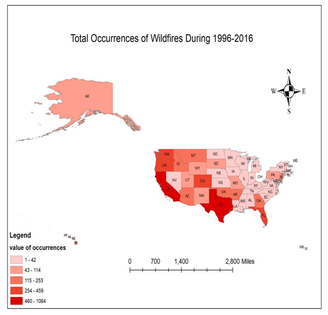


- As shown in the map, Texas has the greatest occurrences of floods, while states including Missouri, Indiana, Ohio, Kentucky, and New York follow behind. States with the least amount of occurrences include but are not limited to Alaska, Utah, and Oregon.

Results



- Based on the map, the single state with the most property loss is California. States with the least amount of property loss include Alaska, Oregon, Nevada, Maine, Montana, Mayland, South Dakota, and New York.
- As shown in the map, wildfires are most prevalent in California, while the rest of the country experience wildfires and property loss, but not to the same degree as California.



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- Based on the map, the states with the most wildfire occurrences are California and Texas, with Washington, Oregon, Colorado, Florida, and New Hampshire coming in second.
- States with the least amount of occurences of wildfires include North Dakota, Kentucky, Alabama, Tennessee, and New York.

Conclusions

- Our research showed that throughout the 21 years reported, the extreme weather event that occurred the most were convective storms, while the extreme weather event that occurred the least was wildfire. Convective storms occurred the least in the west and the most in the south. Because the same thing goes for both floods and wildfires, this leads us to believe that extreme weather events are not very prevalent in the Midwest, with a few exceptions.
- States that are near or bordered by the Gulf of Mexico were prone to convective storms and had the most property loss. Although floods had the highest occurrence in Texas, they mainly happened in the Midwest and part of the northeast.
- Wildfires occurred mainly on the West Coast, but the highest total property loss was exclusively to California. The million dollar property loss were usually very high throughout the 21 years reported for the majority of the events, showing that extreme weather events heavily impact people's property and that precautions must be taken in order to prevent such things from happening again.

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NOAA-CREST program is funded by NOAA/EPP Grant # NA16SEC4810008. HIRES is part of the NYC Science Research Mentoring Consortium funded by the Pinkerton Foundation