

Daniel Rios

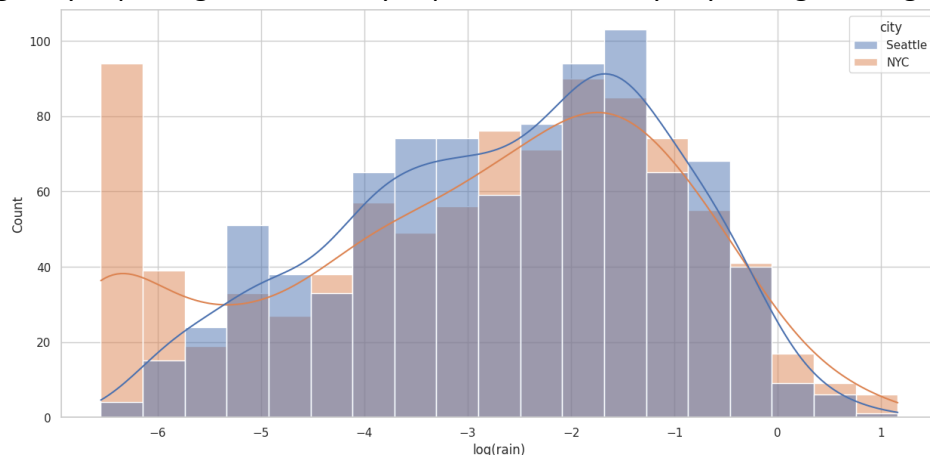
Seattle Weather Project – Write-up

The problem: We will use the data science methodology to investigate whether it rains more in Seattle, WA than in New York City, NY. We'll use data to determine whether this is true or not.

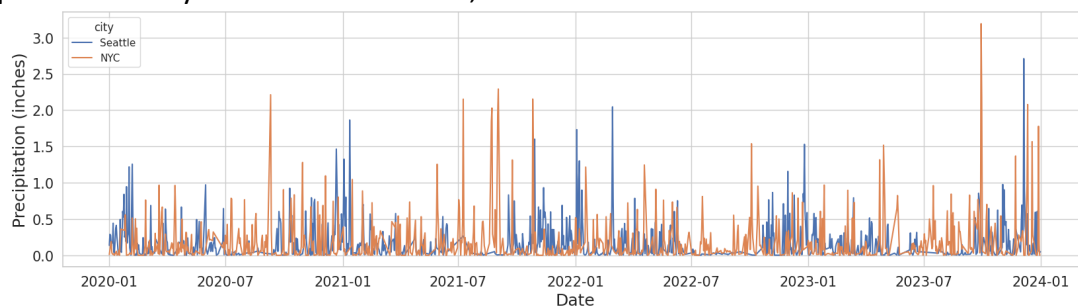
The data: The data is daily precipitation measured in Seattle and New York from January 1, 2020 to January 1, 2024. It's sourced from National Center for Environmental Information using the NOAA climate data source tool. It contains information such as daily observations, the station, location, and precipitation.

Analysis: I first calculated the average daily rainfall in each city and compared the two. This revealed NYC received slightly more rainfall than Seattle; approximately 0.1 more per day. Looking at this from a yearly perspective showed this translated to about 4 inches more per year. The question could be considered answered here, but I wanted to explore further. Humans aren't affected or make decisions around rain purely by measuring the average precipitation over a year, there are several angles to analyze further.

I began by exploring how each city experiences a “rainy day” using a histogram:

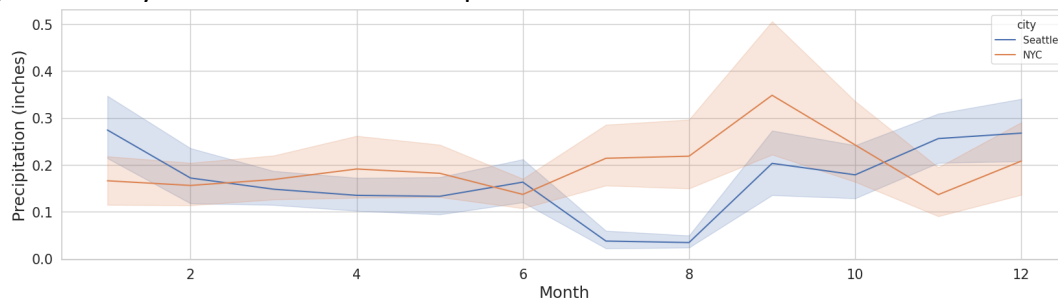


I found that NYC has a higher number of both lower and higher precipitation days than Seattle. Seattle's "rainy" days on the other hand often land more in-between. Seeing a more consistent distribution of precipitation than NYC. NYC's rain seems more volatile, and Seattle's more consistent. I then wanted to examine what the data looks like plotted on a time series, I anticipated NYC may have a lot of outliers, which turned out to be the case:



This shows NYC has more intense rainfall events than Seattle, possibly being the driving factor behind its higher average rainfall. When it rains in Seattle you can expect a consistent amount. When it rains in New York, it's hard to know what you're in for. Perhaps the significant number of "rainy" days that have a low amount of precipitation in NYC drives the narrative that it rains less often than Seattle, it may just be less noticeable outside of the outlier days.

It's interesting to have a look at what the average day looks like, but does this change depending on the time of year? And is it significant when comparing the two? I plotted the average rainfall by month to examine this possible trend:



This shows Seattle experiences a lot of seasonality. In the winter months (Nov - Jan) Seattle gets a lot of rain, all having more than any NYC month outside of September. And in the summer (July - Aug) Seattle gets close to none, having ~0.1 in off from the next driest month. NYC on the other hand is generally consistent with the exception of Aug - Oct, where it sees its highest rainfall. September is an especially notable outlier, on average raining more than any month in either city by ~0.07in. So, which city is rainier really depends on what time of year it is.

Having looked at seasonality, I also wanted to investigate potential yearly nuances. It was found NYC only had higher precipitation for 2 of the 4 years in the sample. In those 2 cases it was by a significant amount (7 to 13 in). As observed previously, NYC appears to be more volatile, whereas Seattle is more consistently within the 38-44 in range. But, why might this be happening? Weather patterns are the likely cause of this unpredictability, the East coast of the US sees more tropical storms whereas the West coast generally doesn't experience these. The highest rainfall in NYC came on September 29th from Tropical Storm Ophelia. The second, from Hurricane Ida. The fourth, also Tropical Storm Ophelia. The significance of September is starting to make more sense. Going forward this also may become increasingly relevant. With climate change causing more extreme storms, NY may become even more rainy and extreme than observed. On the other hand, the Pacific Northwest has seen more extreme droughts and wildfires. The summer generally has low precipitation, so it may be difficult to pull from this data. But should also be considered when looking at the continuing effects of climate change.

To conclude my findings, NYC receives more rainfall than Seattle, but there exist nuanced differences in how each city experiences precipitation essential to the human experience. NYC exhibits more variability in rainfall and Seattle more consistency, both in average daily rainfall and yearly trends. Seasonal and yearly trends play a prominent role, with both Seattle and NYC seeing significant changes in rainfall and flip flopping in which is the rainier city at different times. Extreme weather events such as tropical storms contribute to the variability and are likely to become more significant as climate change becomes more extreme. Whether Seattle or NYC is rainier depends on various factors and perspectives.