Fiker Zewdie

2nd  edit:

Following feedback.

**Paragraph 1** (why do we care):

Extreme heat is a major human health hazard around the world. [Give some examples, like the 2003 European heat wave, as a good example].

Urbanization has left a toll on many communities of people around the world. These urban areas are subject to the effects of the Urban Heat Island phenomenon. As the effects of climate change cause an increase in temperatures, the urban heat island only worsens. Extreme heat events have resulted in heat related mortality. A prime example of an extreme heat event that resulted in disaster was the 2003 European Heat Wave. It resulted in over 70,000 deaths. Such an unprecedented event health hazard that rising temperatures pose on many. Due to the urban heat island, many people in urban areas are subject to higher temperatures than their surrounding suburban areas. Urban areas experience the increasing effects of global warming as well and unbearable heat in summer months. The urban heat island is the idea that due to anthropogenic heat release from urban activity, low surface albedo, and better retention of heat by urban infrastructure there is an increase in temperatures in urban areas (Rizwan). Other studies have found that areas with a higher concentration of people in an area could have a higher relative temperatures than their surrounding rural areas (Chapman).

**Paragraph 2** (we have some idea of what is going on, but also things we don’t know):

Extreme heat can be amplified by both climate change and the urban heat island effect. Explain how (which you already do quite a bit in the text you have written). Highlight, however, that it is still not well understood how differently climate change will affect heat extremes in urban versus non-urban areas

In the latter half of the 1900s, there has been a sharp increase in temperatures worldwide due to global warming. It is known that the urban heat island causes higher temperatures in urban relative to less urbanized areas, but the relationship between the urban heat island and rising temperatures due to global warming is unknown. The urban heat island is the idea that due to anthropogenic heat release from urban activity, low surface albedo, and better retention of heat by urban infrastructure there is an increase in temperatures in urban areas (Rizwan). Other studies have found that areas with a higher concentration of people in an area could have a higher relative temperatures than their surrounding rural areas (Chapman).

**Paragraph 3** (what we are going to do to address the data gap):

You already do a nice job of this in your last paragraph of the introduction-well done! I’ll just add a few edits.

In order to understand the extent of the effects of heat increase, these is a need for the tracking and modeling of these temperatures. Recent studies that have tracked heat waves have looked into measuring the trends of heat waves, but have excluded New York as a part of their study (Habeeb). There is also an understanding that urban This research aims to look at temperature differences between Times Square, an urbanized area of Manhattan and Ardsley, a suburban area in Westchester County, NY. In order to understand the effect of the Urban Heat Island, this research compares Times Square temperatures relative to a less urbanized area of New York, Ardsley. In order to do this, this research plots temperatures over a 67 year period, from 1950 to 2018 and tracks these temperatures to see if there is a significant increase in these temperatures, as well as a difference in these temperatures. This research is aimed to answer if urbanization amplifies warming trends in Times Square more than it does in Ardsley. Additional questions may include, “Are the number of days above the 90th percentile increasing?”, and “Are they increasing at a faster rate in Times Square than they are in Ardsley?”. This research also divides the years into 30 year timeframes ranging from 1951-1980 and 1987-2016 to observe if median temperatures shift over the course of these 30 year periods. This research also aims to test if the number of days above the 90th percentile are increasing over the course of the summer months. In order to test the accuracy of this, a linear regression model would be used. Other questions may ask, How different are median and 90th percentiles summer maximum temperatures between Times Square and Ardsley?, how have the median and 90th percentiles in each location changed between the first 30 years and last 30 years of the available data?, and how sensitive are the number of extreme heat days in each location? This research also addressed what these temperatures may look like in the future and the number of extreme heat days for a given temperature.

Version 1 of intro (draft):

Rationale:

Urbanization has left a toll on many communities of people around the world. These urban areas are subject to the effects of the Urban Heat Island phenomenon. As the effects of climate change cause an increase in temperatures, the urban heat island only worsens. In past research, there have been identified changes in temperature changes in areas like New Zealand and Australia, but there has been very little done on temperature changes in North America (Perkins).

In order for people to understand the effects of the urban heat island, tracking temperatures in further research is needed. Many areas that feel the harsh effects and damage done are large cities. Urban areas experience the increasing effects of global warming, and unbearable heat in summer months. These cities are affected by the urban heat island phenomenon, which says that urban areas have higher temperatures than less industrialized areas. The urban heat island is the idea that due to anthropogenic heat release from urban activity, low surface albedo, and better retention of heat by urban infrastructure there is an increase in temperatures (Rizwan). Other studies have found that areas with a higher concentration of people in an area could have a higher relative temperatures than their surrounding rural areas (Chapman). These urban areas may see particularly different changes in temperature, precipitation, evapotranspiration, cloudiness, wind speed, and other variables as a result of anthropogenic (human caused) release of greenhouse gases. It was also found that higher temperatures were found in more dense areas.

These may all cause effects on sea-level rise in coastal areas, extreme natural disasters, health from unsuitable temperatures, water availability, and food security (Hunt). In North America, populations are most heavily affected by El Nino, which can cause an increase in aridity in lands. There has been a long history of detrimental drought effects on different nations. In the 1930s US, the Dust Bowl occurred as a result of overgrazing and led to increased erosion and dust soils (Dai). Certain areas are going through a megadrought, which is an extreme drought that persists or around 20-40 years. Central America and the Midwest are currently going through a megadrought and this is only expected to come with harsh effects to food security and soil moisture (Cook).

Sources:

Chapman, S., Watson, J. E. M., Salazar, A., Thatcher, M., & McAlpine, C. A. (2017). *The impact of urbanization and climate change on urban temperatures: a systematic review. Landscape Ecology, 32(10), 1921–1935.* doi:10.1007/s10980-017-0561-4

Cook, B. I., Mankin, J. S., & Anchukaitis, K. J. (2018). *Climate Change and Drought: From Past to Future. Current Climate Change Reports, 4(2), 164–179.*doi:10.1007/s40641-018-0093-2

Dai, A. (2010). *Drought under global warming: a review. Wiley Interdisciplinary Reviews: Climate Change, 2(1), 45–65.*doi:10.1002/wcc.81

Hunt, A., & Watkiss, P. (2010). *Climate change impacts and adaptation in cities: a review of the literature. Climatic Change, 104(1), 13–49.* doi:10.1007/s10584-010-9975-6

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RIZWAN, A. M., DENNIS, L. Y. C., & LIU, C. (2008). *A review on the generation, determination and mitigation of Urban Heat Island. Journal of Environmental Sciences, 20(1), 120–128.* doi:10.1016/s1001-0742(08)60019-4

Introduction:

Since the start of industrialization, there has been an increase in temperatures worldwide. Urban areas are susceptible to greater increase in temperatures in comparison to temperatures of less urbanized areas. This is due to the urban heat island phenomenon. In past research, there have been identified changes in temperature changes in areas like New Zealand and Australia, but there has been relatively less research done on temperature changes in North America (Perkins). As temperatures are ever changing, there is a need for constant updates in warming trends in urban areas.

The urban heat island is the idea that due to anthropogenic heat release from urban activity, low surface albedo, and better retention of heat by urban buildings, there is an increase in temperatures (Rizwan). Not only is this a problem currently, but this issue is expected to increase. This can cause many problems, especially for urban populations, which are more susceptible to heat waves due to the urban heat island. The urban heat island is a health hazard that caused numerous deaths (insert statistic). Unbearable temperatures are a health hazard and can result in a number of problems. As there is an increase in temperatures worldwide, reports of heat related mortality and health issues is only bound to increase. Extreme heat events cause more deaths each year than any other extreme weather events combined in the United States (Luber and McGeehin 2008).

In order to understand the extent of the effects of heat increase, these is a need for the tracking and modeling of these temperatures. Recent studies that have tracked heat waves have looked into measuring the trends of heat waves but have excluded New York as a part of their study (Habeeb).

This research aims to look at temperature differences between Times Square, an urbanized area of Manhattan and Ardsley, a suburban area in Westchester County, NY. In order to understand the effect of the Urban Heat Island, this research compares Times Square temperatures relative to a less urbanized area of New York, Ardsley. In order to do this, this research plots temperatures over a 67 year period, from 1950 to 2018 and tracks these temperatures to see if there is a significant increase in these temperatures, as well as a difference in these temperatures. This research is aimed to answer if urbanization amplifies warming trends in Times Square more than it does in Ardsley. Additional questions may include, “Are the number of days above the 90th percentile increasing?”, and “Are they increasing at a faster rate in Times Square than they are in Ardsley?”. This research also divides the years into 30 year timeframes ranging from 1951-1980 and 1987-2016 to observe if median temperatures shift over the course of these 30 year periods. This research also aims to test if the number of days above the 90th percentile are increasing over the course of the summer months. In order to test the accuracy of this, a linear regression model would be used.

Sources:

Luber G, McGeehin M (2008) Climate change and extreme heat events. American Journal of Preventive Medicine 35(5):429–435. https://doi.org/10.1016/j.amepre.2008.08.021