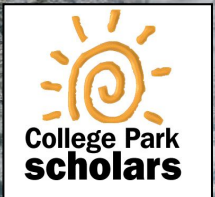




# Impacts of Climate Change: Intensity of Cyclonic Storms



## Introduction

A cyclone is a large scale air mass that rotates around a strong center of low atmospheric pressure

- Pacific cyclones are called Typhoons
- Atlantic cyclones are called Hurricanes
- The center (eye) of the storm is a region of mostly calm weather
- There are 5 categories of intensity for cyclones (1\*)
- Hurricane Katrina caused \$81 billion in property damages (2\*)

Category	Sustained Winds
1	74-95 mph 64-82 kt 119-153 km/h
2	96-110 mph 83-95 kt 154-177 km/h
3 (major)	111-129 mph 96-112 kt 178-208 km/h
4 (major)	130-156 mph 113-136 kt 209-251 km/h
5 (major)	157 mph or higher 137 kt or higher 252 km/h or higher

The above chart shows the wind speeds of cyclones as they progress to higher categories. (1\*)

## How Current Global Change is Making This Worse

According to the Center for Climate and Energy Solutions:

- Warmer sea surface temperatures could intensify tropical storm and wind speeds
- Sea level rise could intensify the flooding and storm surges from tropical storms. (3\*)

Models by NOAA show that:

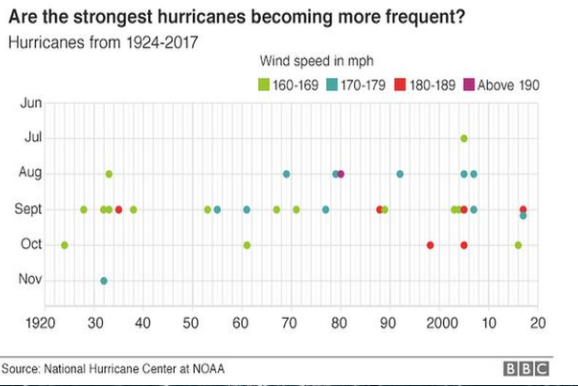
- Hurricane wind speeds will likely increase by 10%
- Hurricane precipitation levels will likely increase by 10-15%
  - Both are due to warmer sea surface temperatures resulting from climate warming. (3\*)

According to a study in *Nature*:

- An increase in intensity of tropical cyclones from 1979–2019 is a consequence of an upward trend in anthropogenic black carbon and sulphate emissions (4\*)

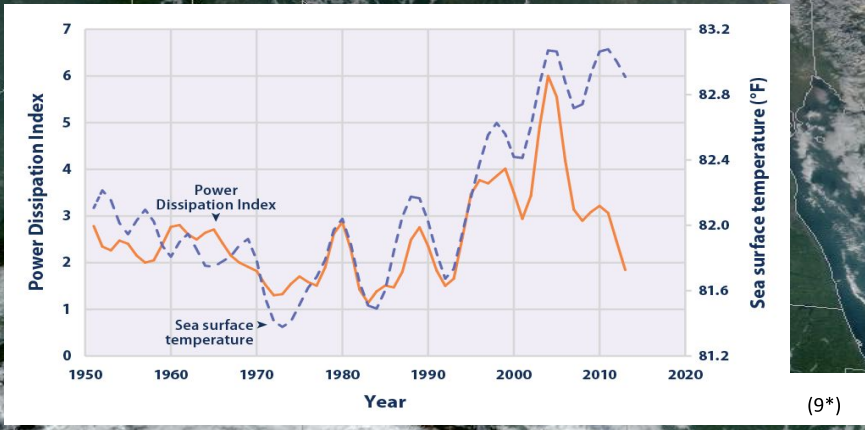
An article from Columbia University describes black carbon as being, "Formed by the incomplete burning of fossil fuels, biofuels and biomass." (5\*)

According to NASA, "under some environmental conditions, aerosols can lead to taller clouds that are more likely to produce lightning and strong downpours. In a few places, meteorologists have even detected a cycle in which the frequency of thunderstorms is connected to mid-week peaks in aerosol emissions. Aerosol type plays an important role in determining how aerosols affect clouds. Whereas reflective aerosols tend to brighten clouds and make them last longer, the black carbon from soot can have the opposite effect." (6\*)



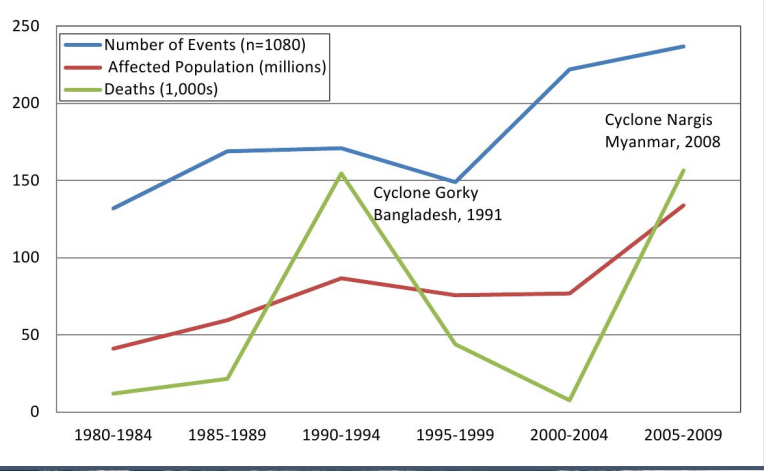
This source above shows data of the frequency of hurricane strengths over a period since 1924-2017 according to data from the National Hurricane Center at NOAA. (7\*)





(9\*)

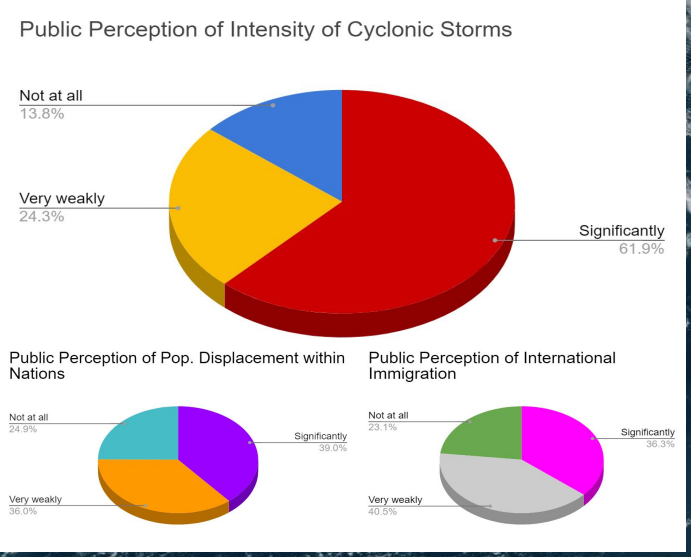
- Impact on Humans**
- Between 1977 and 2009, an estimated 466 million people were affected by cyclonic storms (10\*)
  - Human health consequences include mortality, injury, disease, and displacement from homes/damage to infrastructure (11\*)



**Cyclones' Effect on Human Populations**

The graph to the left shows the yearly number of tropical storms, people affected by cyclonic storms, and fatalities caused by cyclonic storms. (10\*)

**Public perception of Intensity of Cyclonic Storms due to climate change vs. Perception of displacement/immigration of people due to climate change/disasters**



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Results of 333 respondents conducted in Spring 2020 by Scholars SGC to the query, "Please indicate if in your opinion the degree to which this phenomenon is **affected** or **intensified** now or in the near future (within the next 30 years) by global climate change." (12\*)

(8\*)