Climate Analysis of Manipal

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Abstract

This report presents a comprehensive climate analysis of Manipal, Karnataka, examining seasonal patterns in temperature and precipitation, and quantifying the long-term impacts of climate change. Using historical climate data, we analyze annual variation in order to understand seasonal characteristics and use linear regression to identify significant trends in climatic variables over multiple decades. The findings reveal important information on the changing climate in Manipal.

Contents

Seasonal Patterns

0.1 Annual Variation

The temperature and precipitation in Manipal shows clear seasonal patterns over the year.

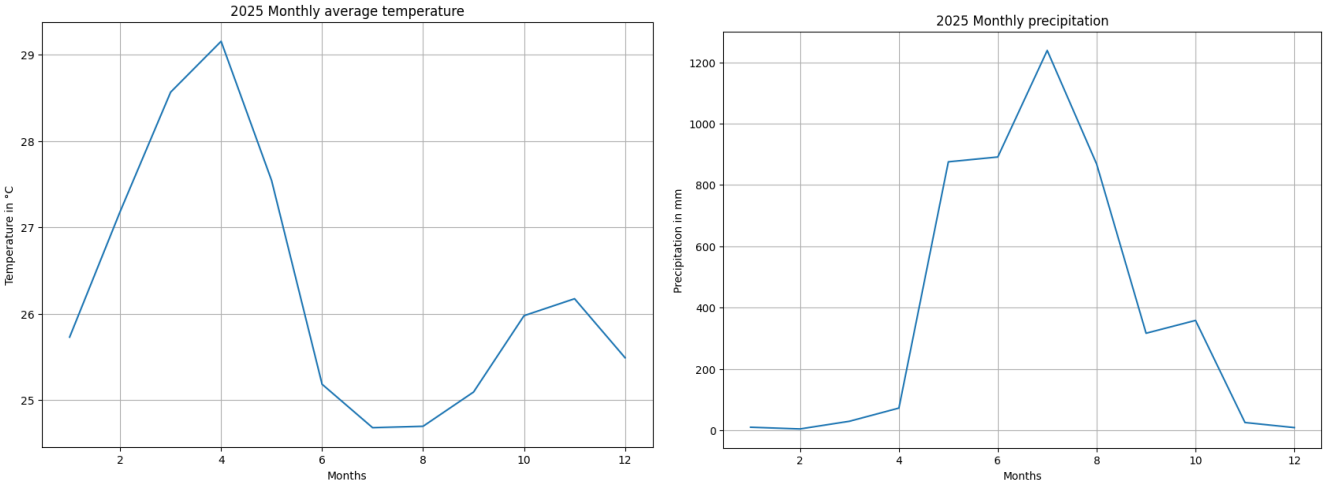

Figure 1: Monthly temperature and precipitation variation throughout the year in Manipal

Peak temperature rise happens around the month on March and April while July and August have the lowest temperatures throughout the year. This is clearly co-related with precipitation levels. During March and April we observe the lowest amounts of rainfall while in July and August, the precipitation levels are at their highest.

0.2 Temperature variation over the years

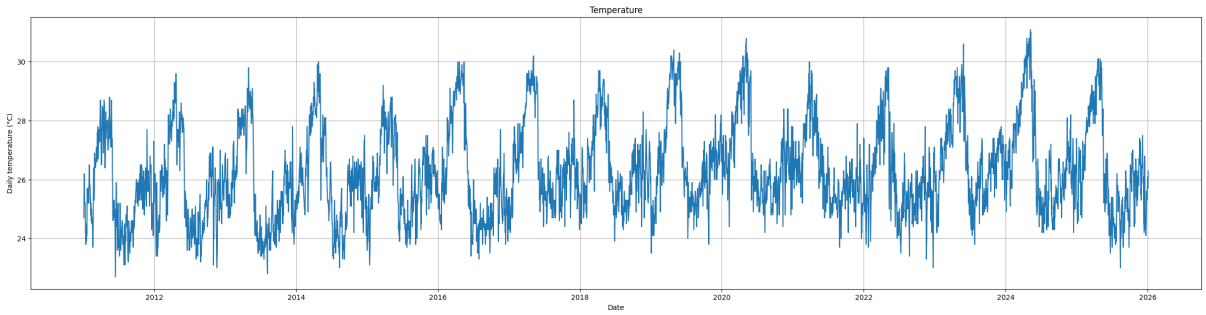

Figure 2: Daily Temperature variation

The average temperature over the years has clearly increased over the past few years. The mean temperature has slowly risen by 0.05 degrees per year between 2011-2026.

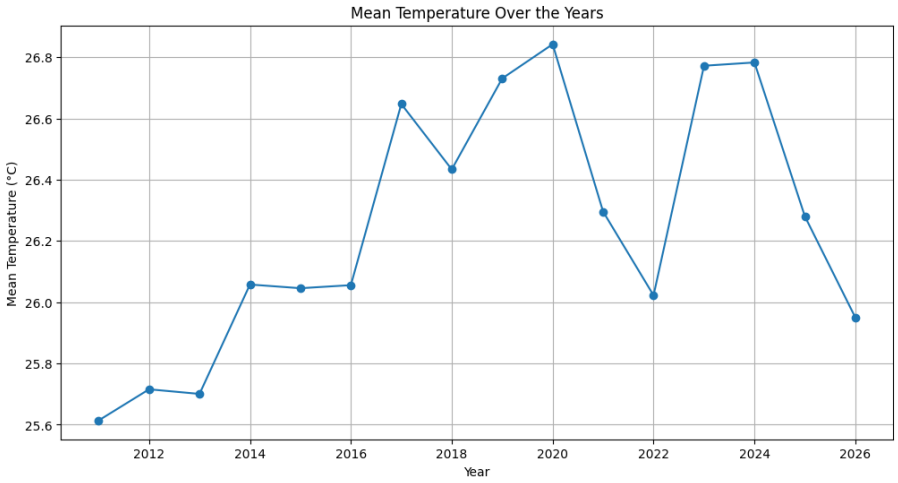

Figure 3: Temperature over the years

There was a fall in temperature from 2020 till 2022 likely due to COVID-19 which likely contributed in decrease in overall pollution levels because of the decrease in activities.

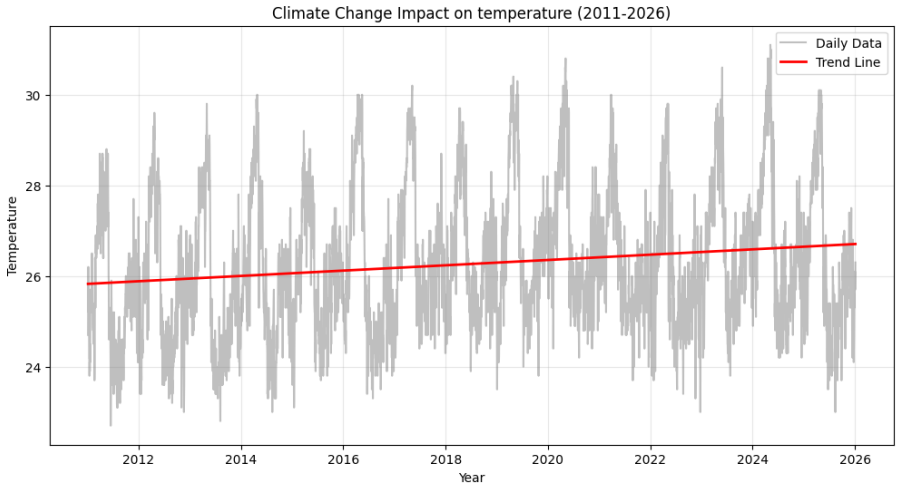

Figure 4: Quantification of temperature change

The graph above quantifies the amount of temperature risen. A Linear regression model was used to quantify long-term trends.
The average temperature has risen by over 0.87 degrees as given by the slope of the model.

0.3 Precipitation variation over the years

Manipal receives the majority of its annual rainfall during the southwest monsoon season (June-September).

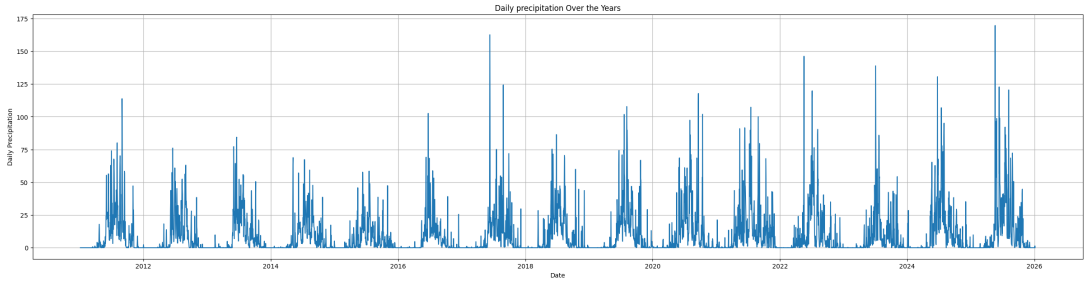

Figure 5: daily Precipitation Over the years

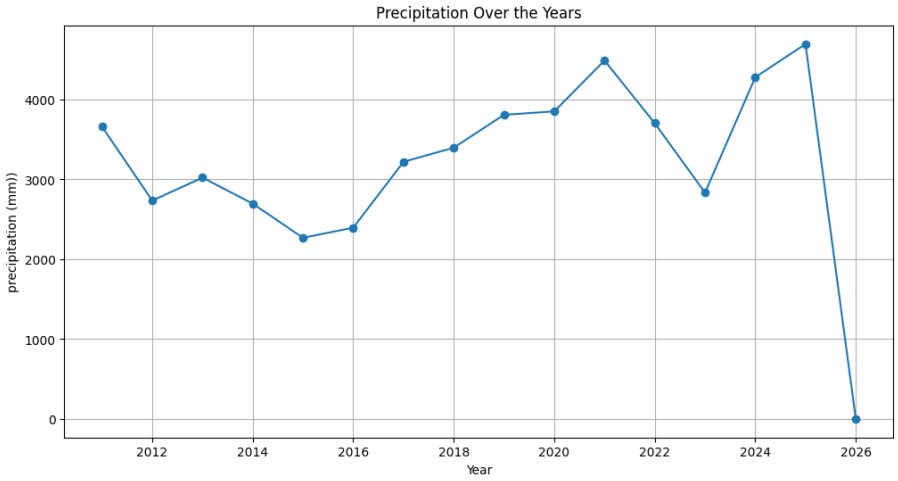

Figure 6: Precipitation per year

There was a drop in precipitation in 2023 as shown but other than that the precipitation over the year loooks pretty consistent.

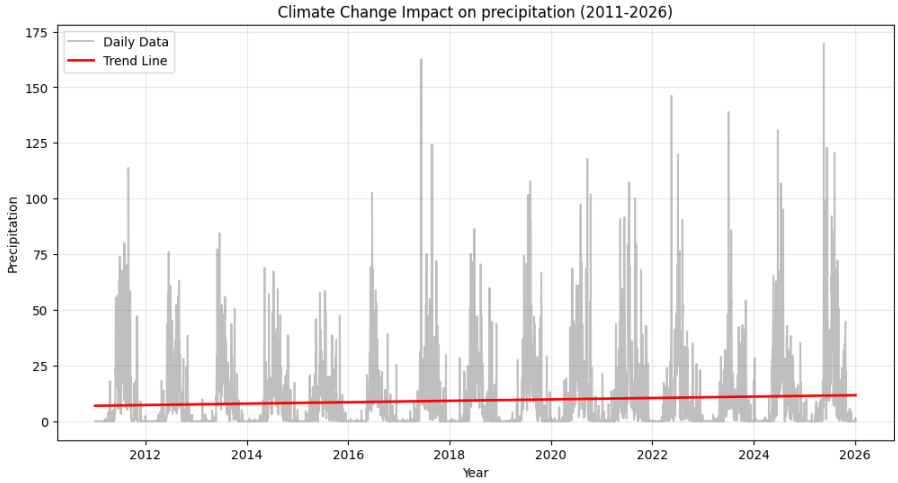

Figure 7: Quantification of precipitation change

The graph above quantifies the amount of temperature risen. Linear regression was used to quantify long-term trends.

The average precipitation has risen by only 4.75 mm as given by the slope of the model.