Air Quality Analysis in Tamil Nadu

Phase 3 development part 2:

To continue the air quality analysis for Tamil Nadu, we can delve into the key factors affecting air quality in the state and the steps taken for its improvement:

Key Factors Affecting Air Quality in Tamil Nadu:

Industrial Emissions: Tamil Nadu is home to a significant number of industries, including automobile manufacturing, textile, and petrochemicals. These industries often emit pollutants like particulate matter, sulfur dioxide (SO2), and nitrogen oxides (NOx), which can severely affect air quality.

Urbanization:

Rapid urbanization and population growth in cities like Chennai, Coimbatore, and Madurai have led to increased vehicular emissions, construction dust, and solid waste generation, all of which contribute to poor air quality.

Agricultural Activities:

In rural areas, agriculture is a significant contributor to air pollution due to the use of fertilizers, pesticides, and crop residue burning. The latter is a major concern during certain seasons.

Natural Factors:

Weather conditions, such as temperature inversions, can trap pollutants close to the ground, exacerbating air quality issues. The state's proximity to the Bay of Bengal also influences air quality, with sea breezes sometimes helping disperse pollutants.

Steps Taken for Air Quality Improvement:

Regulatory Measures:

The Tamil Nadu Pollution Control Board (TNPCB) enforces air quality standards and regulations. It has implemented measures to control industrial emissions and monitor compliance.

Promotion of Green Transport:

Encouraging the use of public transportation, electric vehicles, and cycling can help reduce vehicular emissions. Initiatives such as the Chennai Metro have been introduced to ease traffic congestion.

Waste Management:

Proper waste management and recycling can reduce the release of air pollutants from landfills and open burning. Tamil Nadu has been promoting the "Swachh Bharat" campaign to address waste issues.

Crop Residue Management:

To combat crop residue burning, the government can promote alternatives like the use of crop residue for bioenergy or organic manure, and provide incentives to farmers for adopting these practices.

Greenery and Urban Planning:

Increasing green cover in urban areas can help absorb pollutants and improve air quality. Urban planning should prioritize green spaces and efficient land use.

Air Quality Monitoring:

Expanding and improving air quality monitoring networks across the state is essential for accurate data collection and timely action against pollution sources.

Public Awareness:

Awareness campaigns to educate the public about the importance of clean air and ways to reduce pollution are crucial. Citizen engagement is a valuable tool in the fight against air pollution.

Policy Integration:

Coordinating air quality management with other environmental policies, such as water resource management and land-use planning, can lead to more comprehensive solutions.

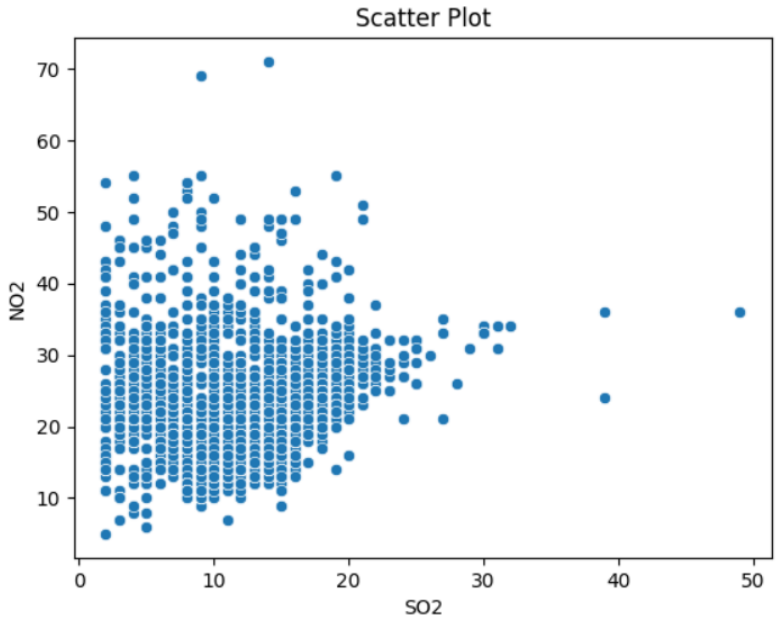
It's important to note that air quality management is an ongoing process, and the effectiveness of these measures will depend on enforcement, public participation, and continuous assessment of air quality data. Additionally, addressing the unique air quality challenges in different regions of Tamil Nadu, such as coastal and industrial areas, will require tailored strategies. Collaborative efforts involving government, industries, communities, and environmental organizations are essential to ensure a sustainable improvement in air quality throughout the state.

Input & Output:

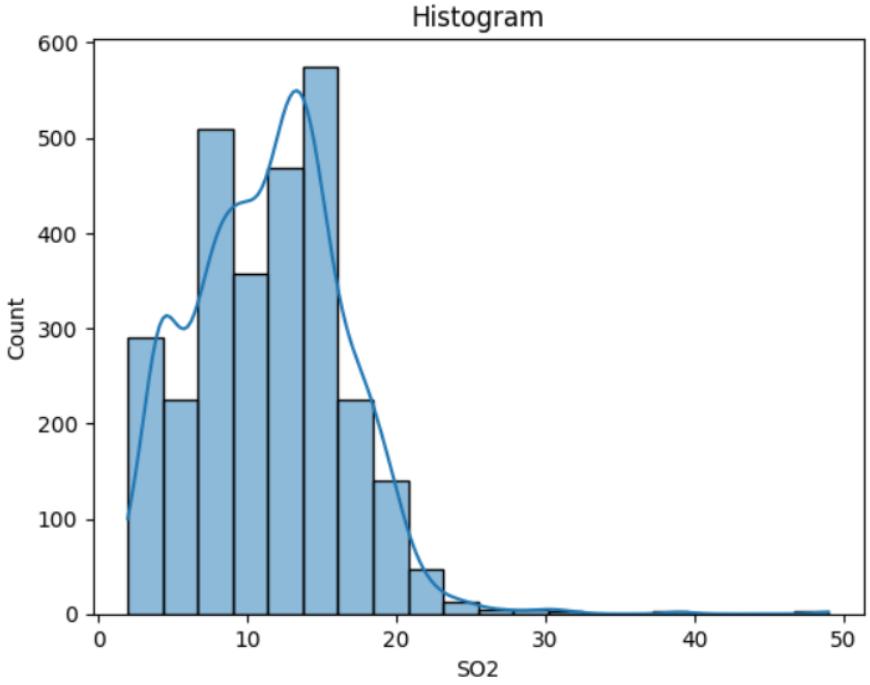
```
[1]  import pandas as pd
     import matplotlib.pyplot as plt
     import seaborn as sns
```

```
[2]  file_path = "/content/cpcb_dly_aq_tamil_nadu-2014.csv"
     df = pd.read_csv(file_path)
```

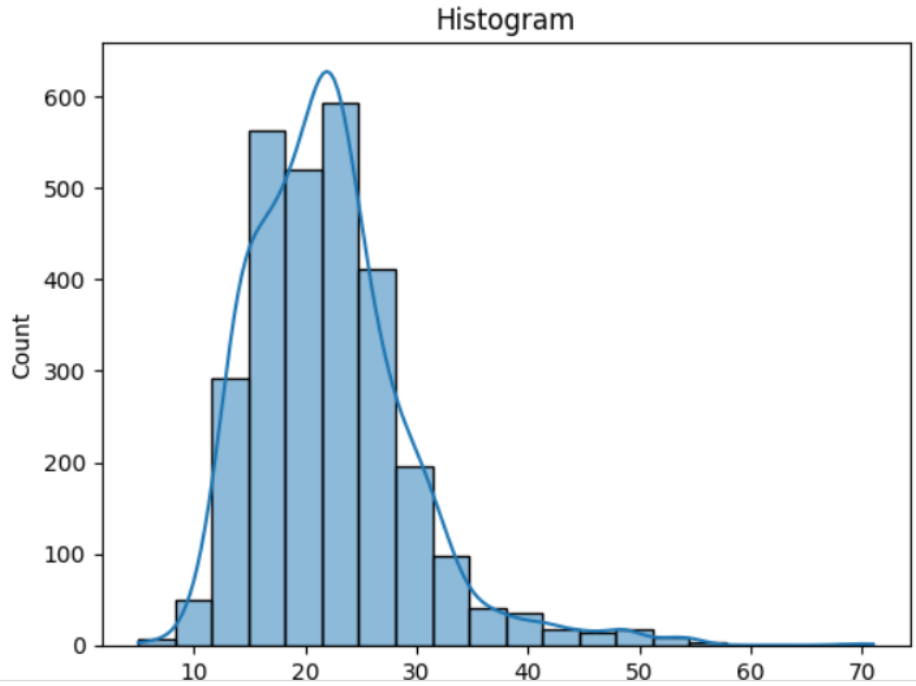
```
[3]  sns.scatterplot(data=df, x='SO2', y='NO2')
     plt.title('Scatter Plot')
     plt.show()
```



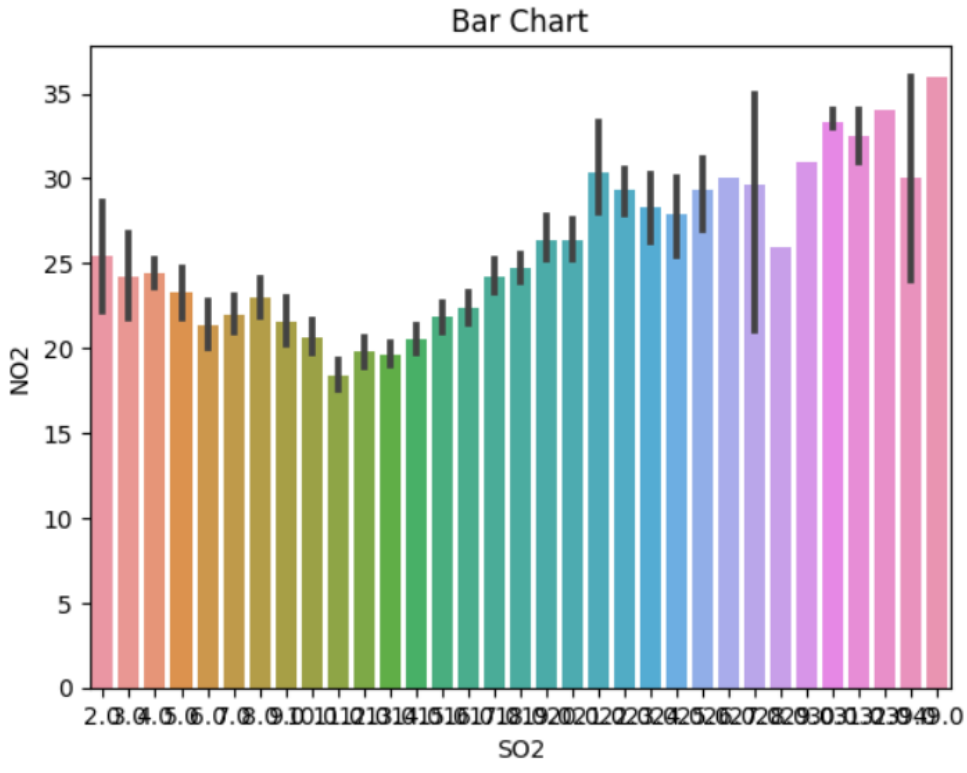

```
[4]  sns.histplot(data=df, x='SO2', bins=20, kde=True)
     plt.title('Histogram')
     plt.show()
```



```
[5]  sns.histplot(data=df, x='NO2', bins=20, kde=True)
     plt.title('Histogram')
     plt.show()
```



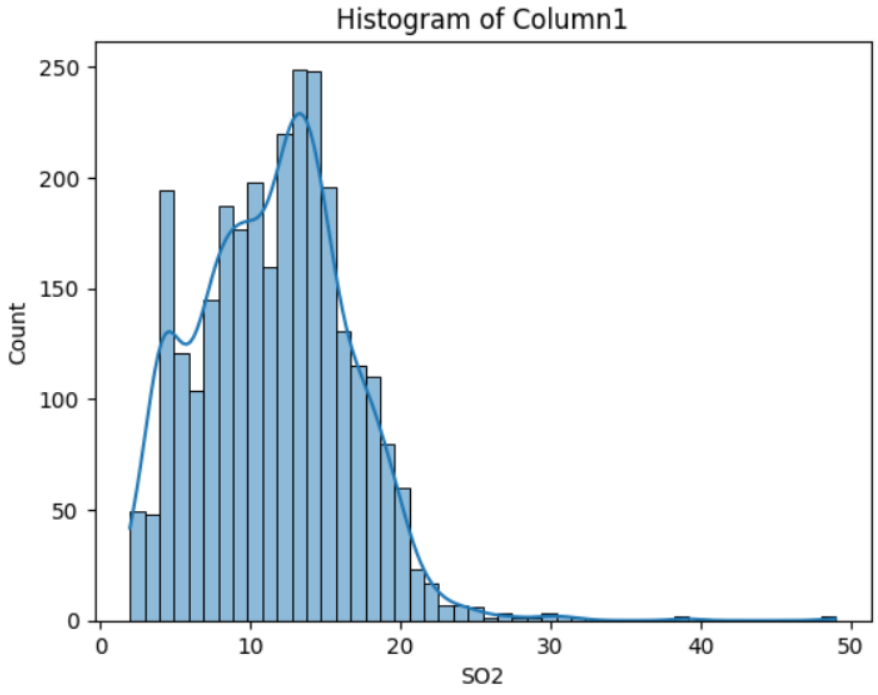

```
sns.barplot(data=df, x='SO2', y='NO2')
plt.title('Bar Chart')
plt.show()
```



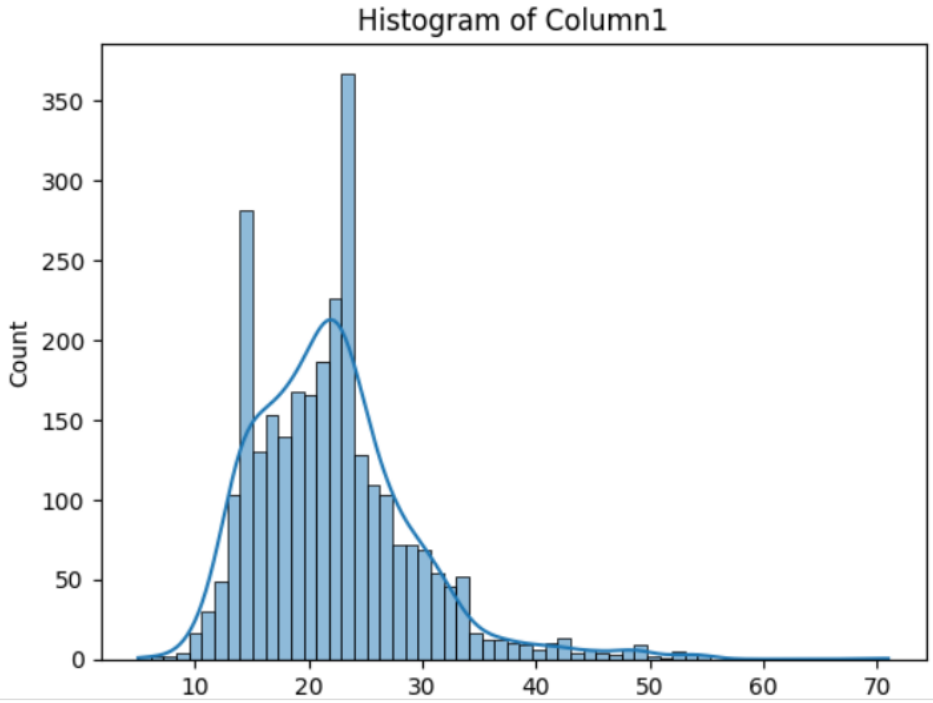
```
grouped = df.groupby(['State', 'City/Town/Village/Area', ])
averages = grouped[['SO2', 'NO2', 'RSPM/PM10']].mean()
averages = averages.reset_index()
print(averages)
```

```
        State City/Town/Village/Area        SO2        NO2  RSPM/PM10
0  Tamil Nadu                Chennai  13.014042  22.088442  58.998000
1  Tamil Nadu             Coimbatore   4.541096  25.325342  49.217241
2  Tamil Nadu              Cuddalore   8.965986  19.710884  61.881757
3  Tamil Nadu                Madurai  13.319728  25.768707  45.724490
4  Tamil Nadu                 Mettur   8.429268  23.185366  52.721951
5  Tamil Nadu                  Salem   8.114504  28.664122  62.954198
6  Tamil Nadu             Thoothukudi  12.989691  18.512027  83.458904
7  Tamil Nadu                 Trichy  15.293956  18.695055  85.054496
```

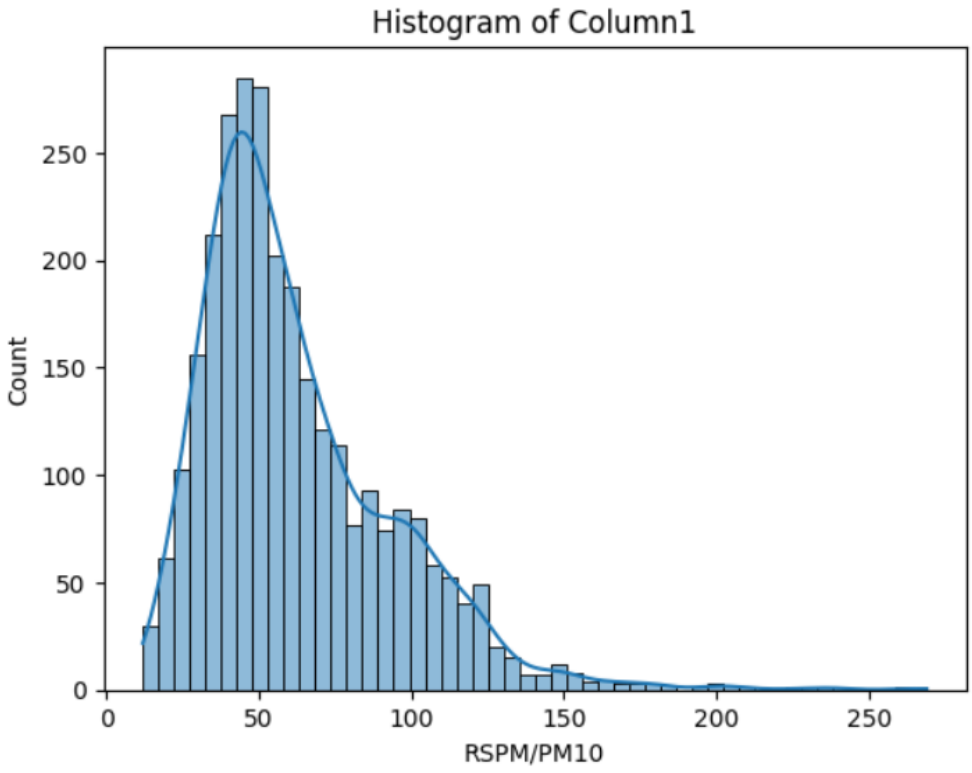
```
sns.histplot(data=df, x='SO2', kde=True)
plt.title('Histogram of Column1')
plt.show()
```



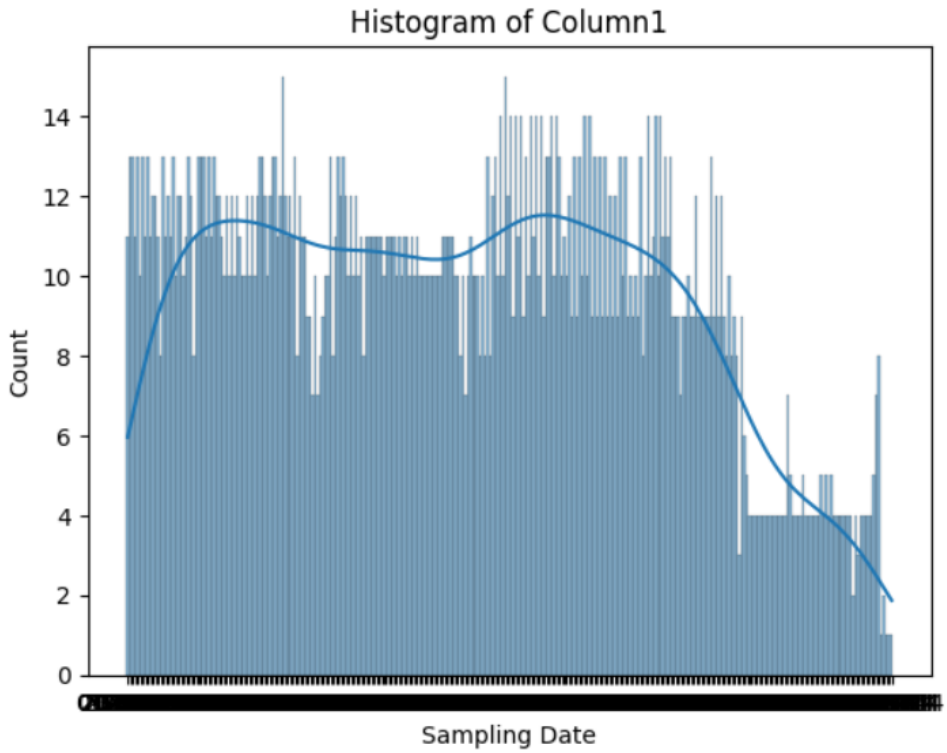
```
[10] sns.histplot(data=df, x='NO2', kde=True)
     plt.title('Histogram of Column1')
     plt.show()
```



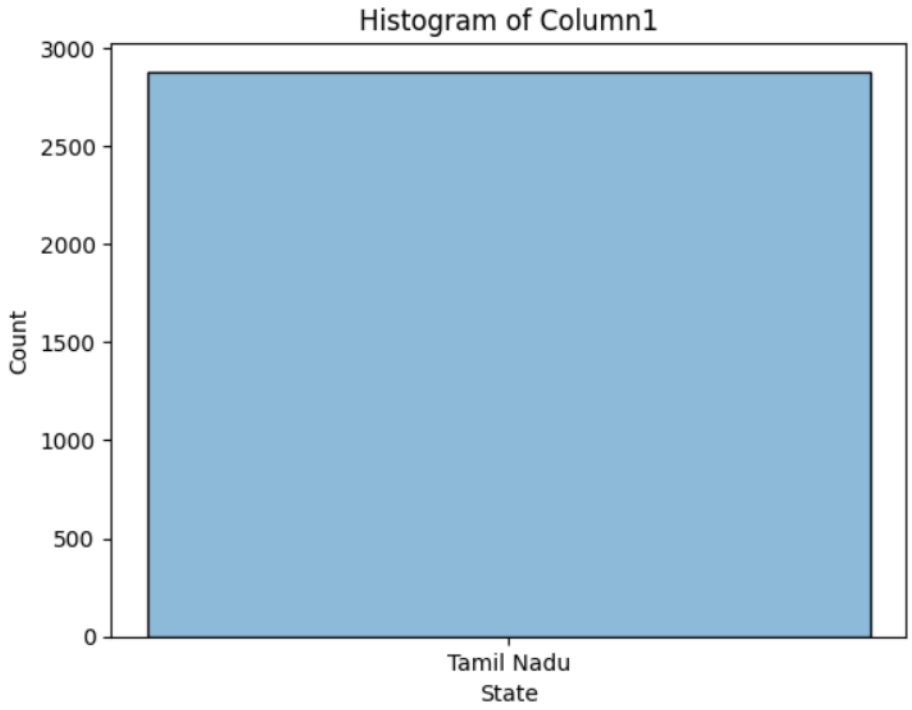

```
sns.histplot(data=df, x='RSPM/PM10', kde=True)
plt.title('Histogram of Column1')
plt.show()
```



```
sns.histplot(data=df, x='Sampling Date', kde=True)
plt.title('Histogram of Column1')
plt.show()
```




```
sns.histplot(data=df, x='State', kde=True)
plt.title('Histogram of Column1')
plt.show()
```



```
[15] df['Sampling Date'] = pd.to_datetime(df['Sampling Date'])
```

```
plt.figure(figsize=(12, 6))
plt.plot(df['Sampling Date'], df['RSPM/PM10'])
plt.title('Pollution Trend Over Time')
plt.xlabel('Time')
plt.ylabel('RSPM/PM10')
plt.grid()
plt.show()
```