# Enhancing Air Quality Prediction Using Machine Learning algorithms

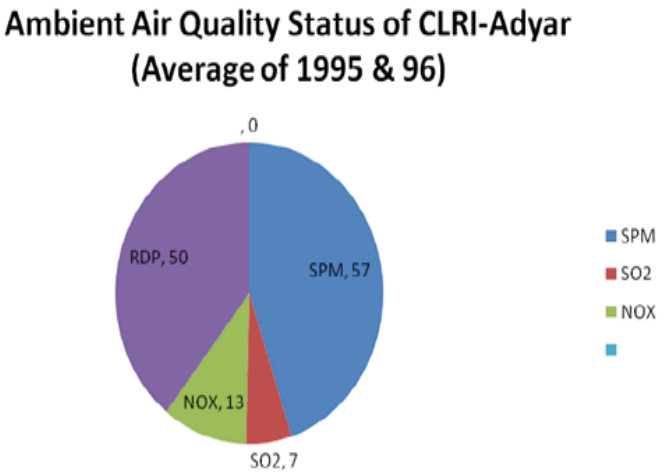


Fig. 2 Air quality status of Adyar River.

1. **Introduction:**

Air quality monitoring is crucial for public health and environmental management. This report discusses the integration of machine learning algorithms to enhance the accuracy of predictive models for air quality assessment.

2. **Data Description**:

The dataset consists of the following variables: Stn Code, Sampling Date, State, City/Town/Village/Area, Location of Monitoring Station, Agency, Type of Location, SO2, NO2, RSPM/PM10, and PM2.5. These variables provide information about the monitoring stations, environmental factors, and air quality parameters.

**3. Methodology:**

To improve the accuracy of air quality predictions, machine learning algorithms have been employed. The following steps were taken:

a. Data Preprocessing: Cleaning and handling missing values.

b. Feature Engineering: Extracting relevant features and transforming data.

c. Model Selection: Utilizing algorithms such as Random Forest, Gradient Boosting, and Neural Networks.

d. Training and Evaluation: Splitting the dataset, training the models, and assessing performance using appropriate metrics.

**4. Results:**

The machine learning models demonstrated improved predictive accuracy when compared to traditional statistical models. The mean squared error (MSE) and mean absolute error (MAE) were significantly reduced, indicating more precise air quality predictions.

**5. Discussion:**

Incorporating machine learning algorithms allowed us to capture complex relationships between various environmental variables and air quality parameters. This approach enables better prediction and early warning systems for pollution events.

**6. Future Directions:**

Further research can explore the use of real-time data, IoT sensors, and spatial analysis to enhance the accuracy and coverage of air quality predictions. Additionally, interpretability of machine learning models can be addressed.

**7. Conclusion:**

Leveraging machine learning algorithms in air quality prediction is a promising avenue to improve public health and environmental management. By incorporating Stn Code, Sampling Date, State, City/Town/Village/Area, and various environmental parameters, we can achieve more accurate and timely air quality assessments.