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Study of Air Pollution level in Coimbatore 2018-2019

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ABSTRACT

Coimbatore, notorious for its air pollution due to various manufacturing industries, is all set to get a first-of-its-kind air monitoring system soon. The Tamil Nadu Pollution Control Board (TNPCB), which is the nodal agency, plans to set up the Continuous Ambient Air Quality Monitoring System (CAAQMS) in the Coimbatore SIDCO branch office, Kurichi, at a cost of Rs.2crore. Air monitoring stations at Gandhi Park, District Collectors office and SIDCO estate. As the ammonia and dust levels in SIDCO Industrial estate have been exceeding permissible levels, the pollution mangers felt the need to install a CAAQMS here. "The 24-hour-real time monitoring system would check for excess levels of carcinogenic chemicals including dioxides of Nitrogen and Sulphur. It would also monitor the PM 2.5 and PM 10 levels, which are highly hazardous to public health," said a senior official of Tamil Nadu Pollution Control Board. The following study reports gives a detail report on study of air pollution level in Coimbatore during the year 2018-2019.

KEYWORDS

CAAQMS - Continuous Ambient Air Quality Monitoring System.
TNPCB - Tamil Nadu Pollution Control Board
PM - Particulate matters
EMI - Electromagnetic Interference
Air Pollution, PM, PM10, PM2.5, Air Quality Forecast, Air Quality Index, Human Health

INTRODUCTION

Many studies suggest that quality of air has been significantly improving in the last few years in the majority of the world regions. However, air quality still creates a significant problem in India, especially in some densely populated urban areas and during certain weather conditions. Several reports observe the serious impact of the air pollution on the people's health and many analysis and models have been tested to understand and finally reduce the problem.

Although PM10 and PM2.5 are considered to be a direct cause of cardiovascular diseases as well as lead to death and it may be a reason for a number of chest diseases in short-term as well as long-term. Results were compared to the Air Quality Forecast system which developed by EEAA and AQI which created by US/EPA was calculated for some PM10 and PM2.5. Probable potential anthropogenic sources for such high concentrations of PM included unpaved roads, indiscriminate demolition and construction work, industrial activities, and solid wastes. This study resulted in a number of suggestions and recommendations include:

1) Implementation of integrated ISO 26000 and ISO 14001,
2) EIMP/EEAA monitoring stations need restructuring plan to cover all areas in Alexandria,
3) EIMP/EEAA must be supported with PM2.5 monitors,
4) PM control systems must be used in all industrial activities to reduce PM pollution from the source,
5) AQL of PM2.5 in the ambient environment must be reduced and it must be included in the working environment parameters,
6) Environmental law must be applied strictly, and
7) Multidisciplinary co-operation especially between environment and public health specialists must be increased.

STUDY AREA

The areas considered for the study of air pollution level within the Coimbatore city are

1) Air monitoring stations at Gandhi Park,
2) District Collectors office and
3) SIDCO estate.

CONTINUOUS AMBIENT AIR QUALITY MONITORING SYSTEM (CAAQMS)

1) APM 460 NLs

The APM 460 NL uses an IMPORTED brushless, continuous rated induction motor driven blower to significantly reduce equipment downtime, maintenance efforts and inconvenience to community. This new improved PM 10 sampler avoids problems arising due to frequent brush wear and limited armature life of blowers used in earlier models.

Special features:

- Significantly reduced noise as compared to most PM 10 instruments in the market.
- Blower with in-built thermal cut-off eliminating the need for a stabilizer.
- Brushless blower reduces equipment downtime and maintenance effort.
- Lockable top cover and gaseous attachment.
- Improved cabinet design which is more sturdy and durable with SS hardware.
- Electromagnetic Interference (EMI) to TVs totally eliminated

Additional advantage with this blower is very low variation in flow rate in 190-230V input power supply range.

Owing to its modular design, APM 460 NL can be easily paired with a gaseous sampling attachment (for monitoring SO2, NO2, NH3, Ozone, etc.) as gaseous sampling requires only a few LPM of air flow. This is possible through an attachable subsidiary unit APM 411 or the more modern APM 411 TE. Kindly refer to respective brochures of APM 411 and APM 411TE for details.

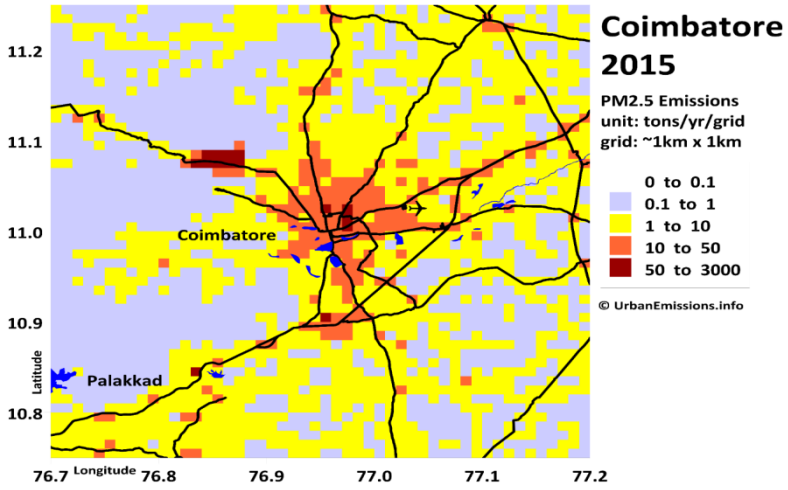
2) APM 550

The APM 550 system is a manual method for sampling fine particles (PM2.5 fraction). Ambient air enters the APM 550 series samplers system through an Omni-directional inlet designed to provide a clean aerodynamic cut-point for particles greater than 10 microns. Particles in the air stream finer than 10 microns proceed to a second impactor that has an aerodynamic cut-point at 2.5 microns. The air sample and fine particulates exiting from the PM2.5 impactor are passed through a 47mm diameter Teflon filter membrane that retains the fine particulate matter

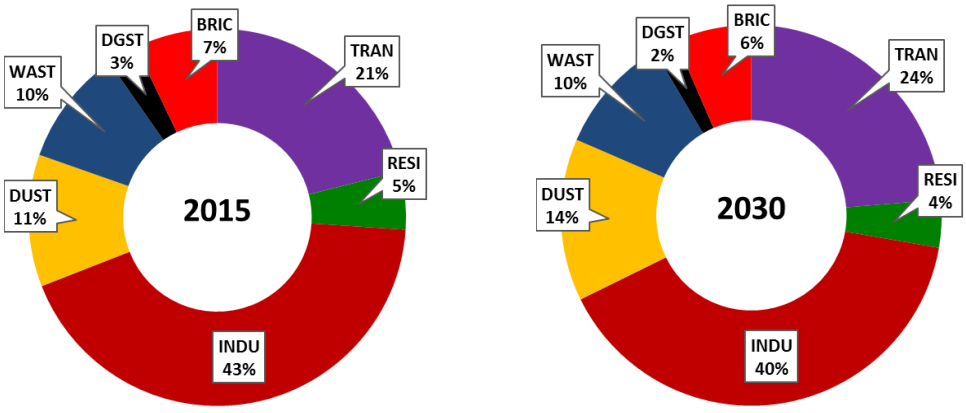
The APM 550 EL has an in-built USB Flash memory based data logger that records Filter ID, air temperature, filter temperature, barometric pressure, flow rate, Coefficient of Variation (CV) and also totalizes and records the volume of air sampled. A PC based software is provided to download the data for audit and prepare an intelligent report highlighting all important information in a convenient graphical format.

Special features:

- PM10 and PM2.5 Impactors as per designs standardized by USEPA
- Microprocessor based controller maintains constant air sampling rate of 16.7 LPM
- Microcontroller based data logger records Air Temp., Filter Temp., Filter Pressure, Barometric Pressure, Flow Rate and Air Sample Volume
- Data Recorded in USB Memory stick
- In-built system to control start and stop times of sampler
- Auto Shut off of Sampler if flow rate falls below 1 m3/hr. due to filter choking
- Large 40 Ch. X 4 line back lit LCD provides all system parameters at a glance
- Summary of run time parameters provided at end of sample duration
- PC based software provides intelligent report of all system parameter



AQI LEVEL	Health Descriptor	Meaning
0 - 50	GOOD	Quality is considered satisfactory and poses little or no risk to health
51 - 100	MODERATE	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution
101 - 150	UNHEALTHY FOR SENSITIVE GROUPS	Although the general public is not likely to be affected at this AQI range, people with lung disease, older adults and children are at a greater risk from exposure to ozone, whereas persons with heart and lung disease, older adults and children are at greater risk from the presence of particles in the air
151 - 200	UNHEALTHY	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects
201 - 300	VERY UNHEALTHY	Health alert: everyone may experience more serious health effects
301 - 500	HAZARDOUS	Health warnings of emergency conditions; the entire population is more likely to be affected



- TRAN = transport emissions from road, rail, aviation, and shipping (for coastal cities);
- RESI = residential emissions from cooking, heating, and lighting activities;
- INDU = industrial emissions from small, medium, and heavy industries (including power generation);
- DUST = dust emissions from road re-suspension and construction activities;
- WAST = open waste burning emissions;
- DGST = diesel generator set emissions;
- BRIC = brick kiln emissions (not included in the industrial emissions)

Findings and Recommendations

- Modeled urban average ambient PM2.5 concentration is 19.4 ± 4.0 μg/m3 – is well below the national standard (40) and ~2 times the WHO guideline (10)
- On an annual average, the city benefits significantly from the string westerlies and monsoons, in keeping the pollution levels low
- The city requires at least 19 continuous air monitoring stations to statistically, spatially, and temporally, represent the mix of sources and range of pollution in the city (current status – 3 manual and 0 continuous)
- The modeled source contributions highlight transport (including on road dust), industries (large cement plants), and open waste burning as the key air pollution sources in the urban areas
- While the contribution of sources outside the urban airshed is an estimated 33% of the ambient annual PM2.5 pollution (in 2015), mostly stemming from large industries, brick kilns, and agricultural activities, n absolute terms, this is a equivalent to background concentrations
- Inside the city, there is a growing need to aggressively promote public and non-motorized transport as part of the city's urban development plan, along with the improvement of the road infrastructure to reduce on-road dust re-suspension
- By 2030, the vehicle exhaust emissions are expected to remain constant, if and only if, Bharat 6 fuel standards are introduced nationally in 2020, as recommended by the Auto Fuel Policy
- By 2030, the share of emissions from residential cooking and lighting is expected to decrease with a greater share of LPG, residential electrification, and increasing urbanization
- The 120 brick kilns in the urban airshed are fueled mostly by coal, agri-waste, and other biomass. These kilns can benefit from a technology upgrade from the current fixed chimney and clamp style baking to (for example) zig-zag, in order to improve their overall energy efficiency
- The cement manufacturing plants need to practice and enforce stricter environmental standards for all the criteria pollutants to reduce their share of influence on urban air quality
- Open waste burning is dispersed across the city and requires stricter regulations for addressing the issue, as the city generates ever more garbage, with limited capacity to sort and dispose of it.

CONCLUSION:

The current work was carried out to estimate the climatic variation in AQI at four different areas of Coimbatore, Tamil Nadu. Industrial emissions (foundry units) and automobile emissions are the major sources of pollution which determine the ambient air pollution condition of the zone. It is observed that the AQI is lower during monsoon, followed by summer and higher in winter. Results also revealed that, the pollution level is low for residential zones and moderate for commercial zone and is high for industrial zone.

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