

# ENVIS-IITM NEWSLETTER

Indian Institute of Tropical Meteorology, Pune  
**Atmospheric Pollution & Climate Change**

(The project of Ministry of Environment, Forest & Climate Change, Govt. of India)



## Status of Air Quality Mumbai & Pune



### EDITORIAL TEAM

Gufran Beig, (ENVIS Coordinator)  
Suvarna Tikle, (Event Coordinator)  
Samir Dhapare (Program Officer)  
Aishwarya Purwant, (Information Officer)  
Gaurav Shinde, (I. T. Officer)  
Darshan Jadhav (Data Entry Operator)

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## *Editorial*

*India is a biggest democracy in the world and is performing excellently to achieve economic goals. The world's second top populous country having equal number of skilled man power is attracting many businesses from around the world to India. Indigenous businesses are also not far behind and are setting new records. Along with such advancements, we are also experiencing extreme weathers & pollution events in recent years. Our rivers are getting much more polluted due to human activities than before; due to excess use of chemical fertilizers, Our soils are becoming unfertile; due to unscientific municipal & industrial waste management, Our ground water, surface water bodies & atmosphere is getting polluted. Rapid population growth & migration towards in the urban centers is making the situation more uncontrollable.*

*Mumbai & Pune are such two rapidly growing urban centers in India. Mumbai already has establish as financial capital of the country & Pune in recent decade has emerge as a city with cultural, educational and I.T. hub. With the kind of the rapid and inclusive development both the cities has shown; the attempt has made to throw light on the 'Status of Air Quality –Mumbai & Pune' in this news letter.*

*-Dr.Gufran Beig*

## What is Air Pollution?

In 21<sup>st</sup> century, our society is witnessing development in social, financial & infrastructural aspects. In course of these development activities, we are knowingly or unknowingly adding undesirable substances in atmosphere; which is changing ambient air's composition. This change in the composition of ambient air is termed as 'Air Pollution'. An air pollutant is defined as any solid, liquid or gaseous substances present in the atmosphere in such a concentration which is or can be injurious to human being and other living creatures or environment.

### Major Sources of Air Pollution in the Megacities of India

There are both natural as well anthropogenic sources of the air pollution getting added in the environment. The natural sources of pollutants include pollens, salt spray, windblown dust, fog etc., while anthropogenic sources includes activities such as burning fossil fuel for vehicles, power generation, industries; construction activities, Stone-quarrying activities, re-suspension of road dust, use of biomass fuel for cooking contribute towards anthropogenic sources.



**Pollens from plants**



**Windblown dust**



**Sea salt spray**



**Fog**

*Figure 1: Natural Sources of Pollution*





**Windblown Dust due to construction**



**Dust re-suspension due to roadwork**



**Industrial Sector**



**Transport Sector - Vehicular emission**



**Emissions from frequent fires on MSW dumping grounds**



**Biofuel- for domestic cooking**



**Power Sector**



**Stone- Quarrying activities**

*Figure 2: Anthropogenic Sources of Air Pollution*

## Legislative Framework to control Air Pollution

The Air (Prevention & control of Pollution) Act came into force in 1981 & Central Pollution Control Board (CPCB), New Delhi has appointed as a statutory body and has given authority to exercise & perform its function for implementation of the this act. The CPCB has proposed & updated time to time, annual & daily standards of the various air pollutants. The standards are designed for two categories,

- 1) Industrial, Domestic, Rural & other areas
- 2) Ecological sensitive areas (Notified by Central Government)

## About Mumbai and Pune

Mumbai the financial capital of the country situated on western coast of the country is land of opportunities and here everyone gets bread & butter. The population of the Mumbai was around 2 Cr. according 2011 census & is 2<sup>nd</sup> densely populated city in India. On the other hand, not that crowded yet rapidly expanding Pune is situated in the Western Ghats. It is also popularly known as Queen of the Deccan & Oxford of the east as it harbors many renowned educational institutions. The population of Pune is around 34 Lakhs according 2011 census. In recent years, due to excellent connectivity between these two cities, both the cities are evolving together & with great pace. Pune is located at a distance of about 160 km from Mumbai.

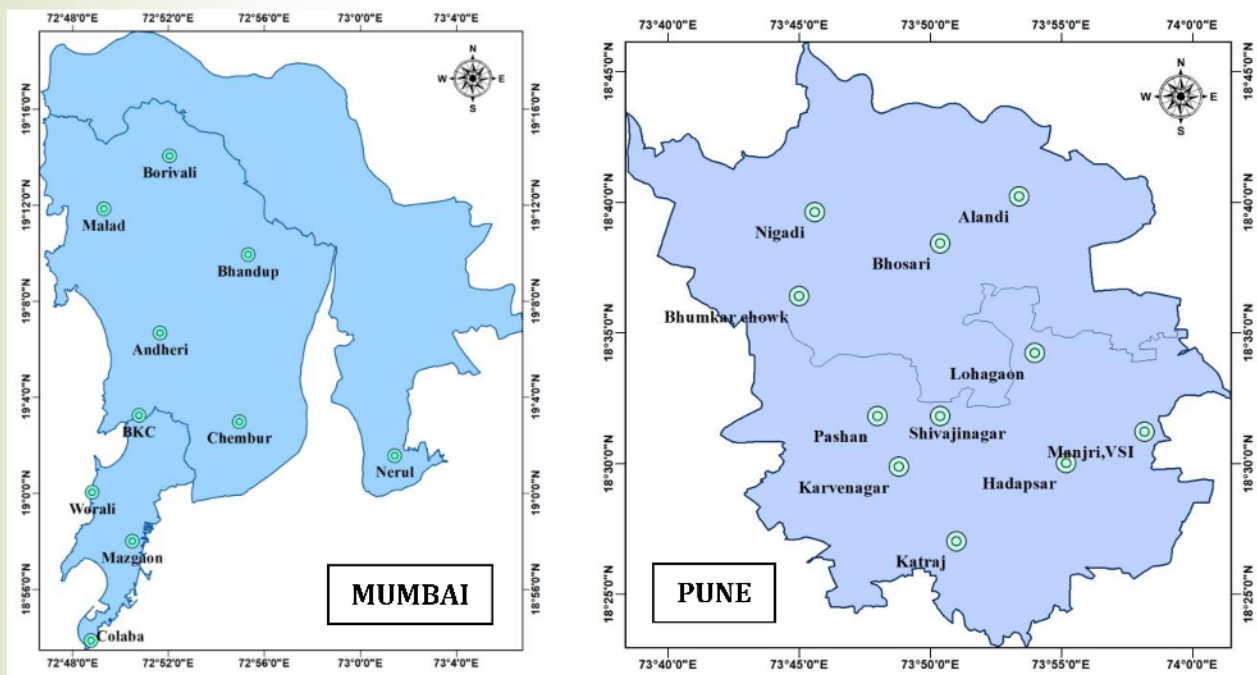


Figure 3: Location Maps of Mumbai & Pune metropolitan with SAFAR Air Quality Monitoring Stations

Rapid development is seen in public infrastructure, industries, IT-sector, education and in many others & along with development there comes pressure on natural resources. In a last year, incidences related to air pollution was reported many a times from these two cities.

### **Status of Air Pollution- Mumbai & Pune**

The Pune and Mumbai are ranked as top two livable cities in India by Ministry of Housing & Urban Affairs in 2018. The 'Ease of Living' Index was put forth by Government to assess themselves with national and global standards and encourage them to become best example. The score for the cities were given under three pointers and weight was assigned for the each pointer. The pointers weights are Institutional with 25 points, Social with 25 points, Economy and Employment with 5 points, and Physical with (45 points).

Although the cities are ranked as top livable cities, they have to address environmental aspects too. Atmospheric pollution has to be given priority in these environmental aspects as it affects all classes/components of the society. First we have to understand role of the geographic location of both cities to understand the air pollution scenario. Mumbai is costal city and it has sea breeze as important component of the atmosphere. This sea breeze must be having a major role in maintaining the air quality & taking away the toxic pollutants emitted due to various human activities. On the other hand, Pune-city is located at 559 meters from the mean sea level & on the Deccan Plateau. Here there is no sea breeze to take away the atmospheric pollutants but Pune is located along the Western Ghats. The forests here are best non-equatorial evergreen forest & its high montane forest ecosystem influence Indian monsoon weather pattern. This rich natural ecosystem serves the city of Pune with pleasant weather & must be acting as biggest carbon sink. In spite, the cities are blessed with such a natural cleaning mechanism the Mumbai ranked 4<sup>th</sup> most polluted city and Pune is also experiencing worse urban air quality in last decade.

In view of this, SAFAR (System of Air quality & weather Forecasting And Research) was launch for monitoring & forecasting the urban air quality and currently operational in four megacities of India i.e. Delhi, Pune, Mumbai & Ahmadabad. The program involves establishing a dense observing network, forecasting and modeling on super computers, and emission inventory. Thereafter for dissemination of information in the form of LED displays, SMS alerts, IVR-services, live web portal and Mobile App. has been included. The SAFAR network of Air Quality Monitoring System (AQMS) and Automatic Weather Stations (AWS) established within city limits represents selected



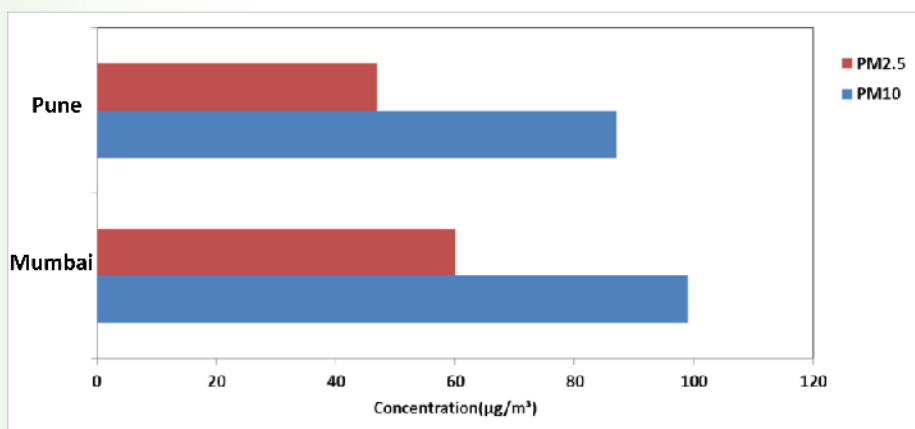
microenvironments. The SAFAR monitoring network is installed to cover microenvironments such as city background, commercial, urban complex, sub-urban, residential, and industrial, road side, traffic junction, etc. The parameters monitored at SAFAR AQMS are shown in the **Table 1** with criteria pollutants which used to define the Air Quality Index (AQI). AQI convert monitoring data into the publically understandable information about air quality. The SAFAR system provides information on current and 1-3 days' advance forecast for air quality and weather, on harmful radiation and the emission scenario over the city area in a simple and user-friendly format. On the basis of the real time monitoring data, health advisory is also given for the public which is improving public health & reducing medical expenditure.

**Table 1: Parameter monitored by SAFAR**

Air Pollutants	Meteorological Parameters	Criteria Pollutant for defining AQI
PM <sub>1</sub> , PM <sub>2.5</sub> , PM <sub>10</sub> , Ozone, CO, NO <sub>x</sub> (NO, NO <sub>2</sub> ), SO <sub>2</sub> , BC, Methane (CH <sub>4</sub> ), Non-methane hydrocarbons (NMHC), VOC's, Benzene, Mercury	UV Radiation, Rainfall, Temperature, Humidity, Wind speed, Wind direction, solar radiation	PM <sub>2.5</sub> , PM <sub>10</sub> , Ozone, CO, NO <sub>2</sub>

(PM: Particulate Matter, BC: Black Carbon, VOC: Volatile Organic Compounds )

It is observed that, at many places the particulate matter is lead pollutant which is defining the AQI of the place. Its impact on human health is detrimental & especially the fine particles get inhaled deep into lungs leading to many pulmonary disease. Particles are primarily produced by mechanical processes such as construction activities, road dust-suspension and wind; whereas the latter originate primarily from combustion sources. In some areas, the combustion of wood and other biomass fuels can be an important source of particulate air pollution, the resulting combustion particles being largely in the (PM<sub>2.5</sub>) mode. In most urban environments, both coarse (PM<sub>10</sub>) and fine mode (PM<sub>2.5</sub>) particles are present, but the proportion of particles in these two size ranges is likely to vary substantially from one city to another around the world, depending on local geography, meteorology and specific PM sources.



*Figure 4: Particulate Matter concentrations of Mumbai & Pune, 2018*

The SAFAR monitoring data of Particulate Matter (PM<sub>10</sub> & PM<sub>2.5</sub>) of 2018 (Figure 4) shows that in spite of having such high industrial and other developmental activities the PM (PM<sub>10</sub> & PM<sub>2.5</sub>) concentrations of Mumbai are not exceeding limits and Pune is well below the limits. The coastal weather might be having role of sweeping the air pollutants from Mumbai.

**All queries and feedback regarding this newsletter should be addressed to:**

**Dr. Gufran Beig**

**ENVIS-Coordinator**

**Indian Institute of Tropical Meteorology,**

**Dr. Homi Bhaba Road, Pashan, Pune -411008, India**

**Phone: +91-20-2590-4212 | Fax: +91-20-2586-5142**

**[www.iitmenvis.nic.in](http://www.iitmenvis.nic.in) | [iitm-env@nic.in](mailto:iitm-env@nic.in)**