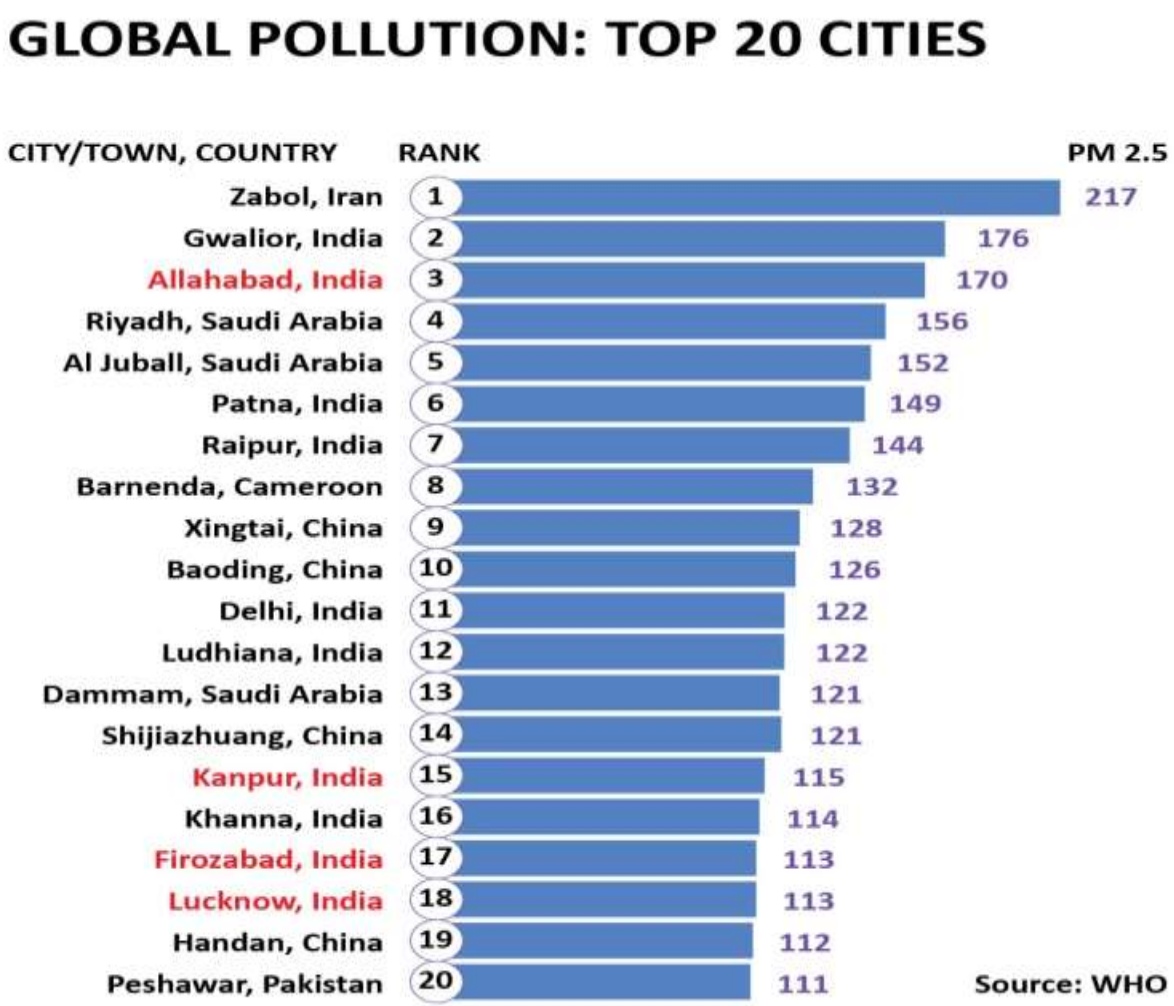
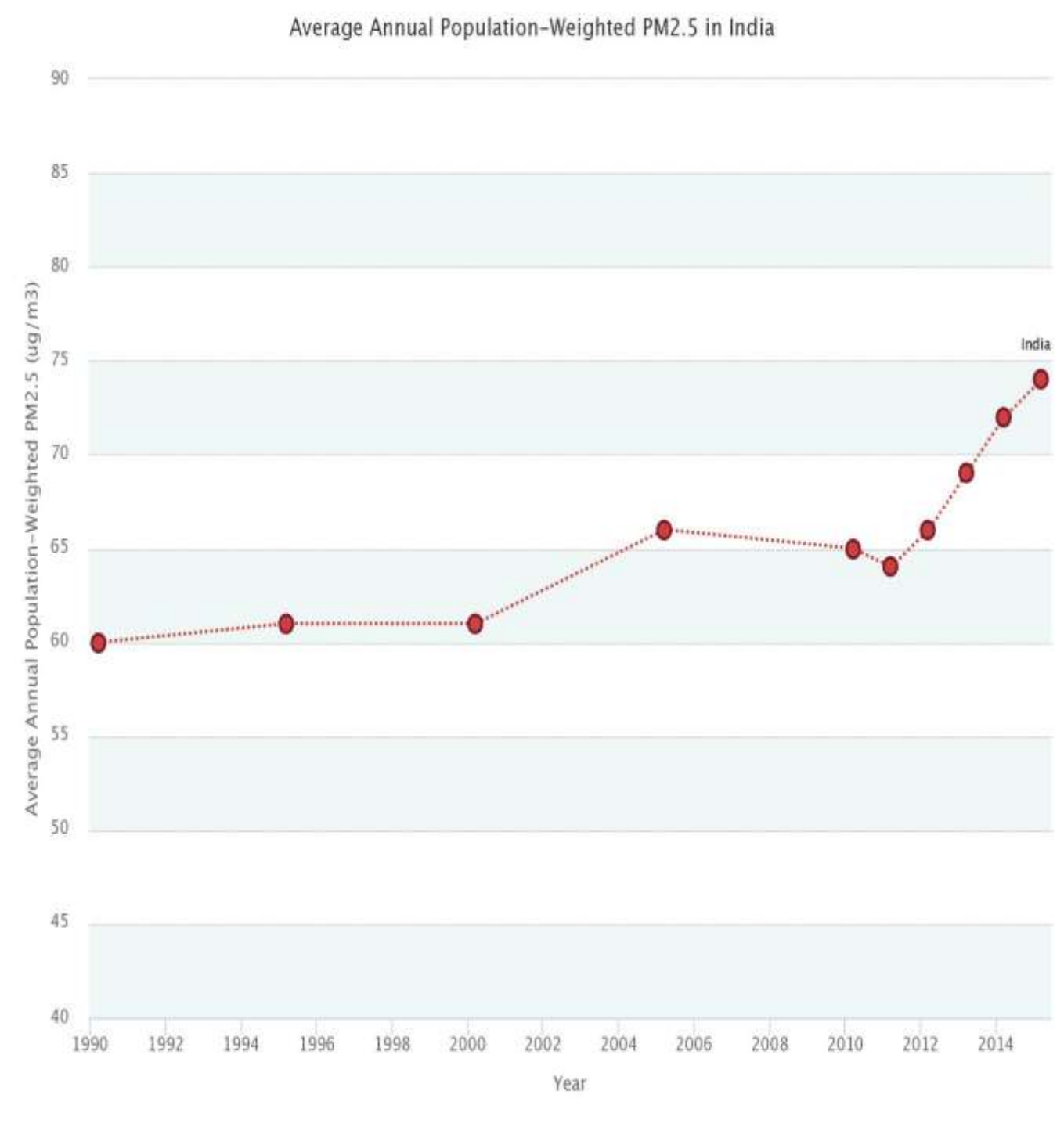
India's Air Pollution Crisis , How does Bangalore fare?

By Aishwarya Sudhir

WHO RANKING OF CITIES 2016 Data

Cities with the worst air quality in the world





PM2.5 Levels in 2015, Annual Average, weighted mean.
Health Effects Institute , State of Global Air report, 2015

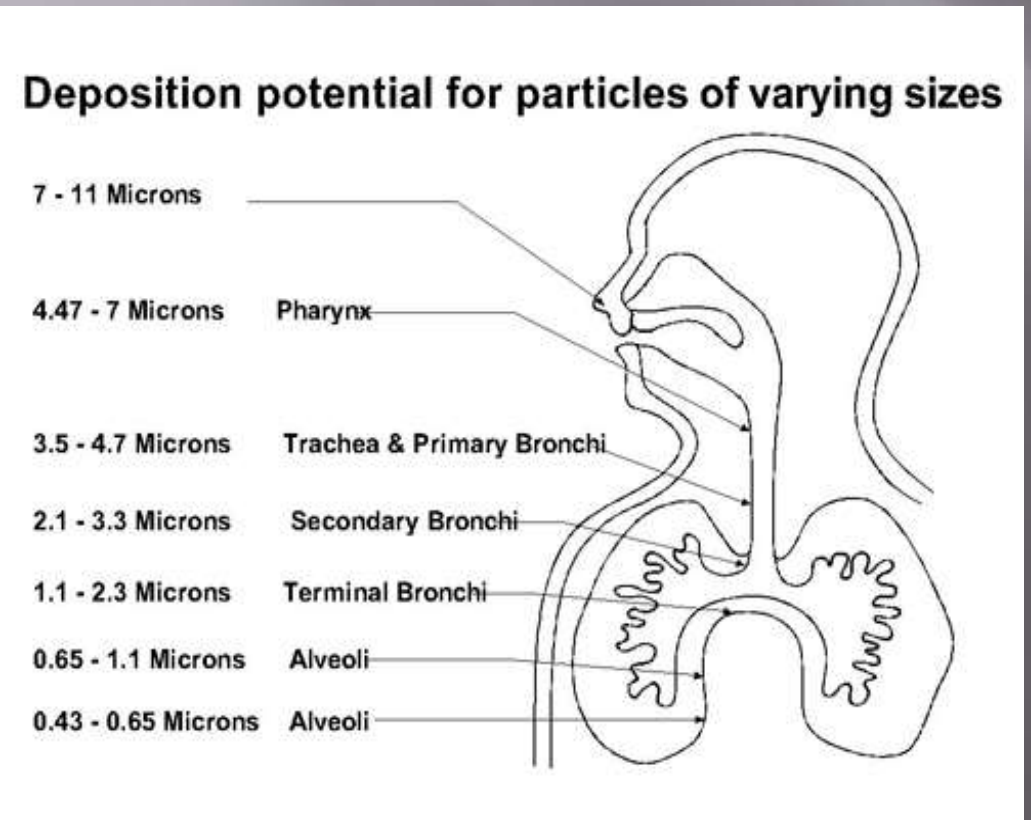
Delhi's Average is about 153ug/m3

Estimated health impacts – Premature mortality of about 100,000 plus annually

Current FOCUS - Particulate Matter(PM) or RSPM

The emphasis on PM 2.5 and PM 10

Why we need to worry about them : According to the WHO, PM affects more people than any other pollutant. The major components of PM are sulfate, nitrates, ammonia, sodium chloride, black carbon and mineral dust.



- **Nano-particles (<100 nm) can pass through the cell membranes and migrate into the blood stream, even into the brain.**
- **Causes asthma, lung cancer, cardiovascular disease, respiratory diseases, premature delivery, birth defects, and premature death.**

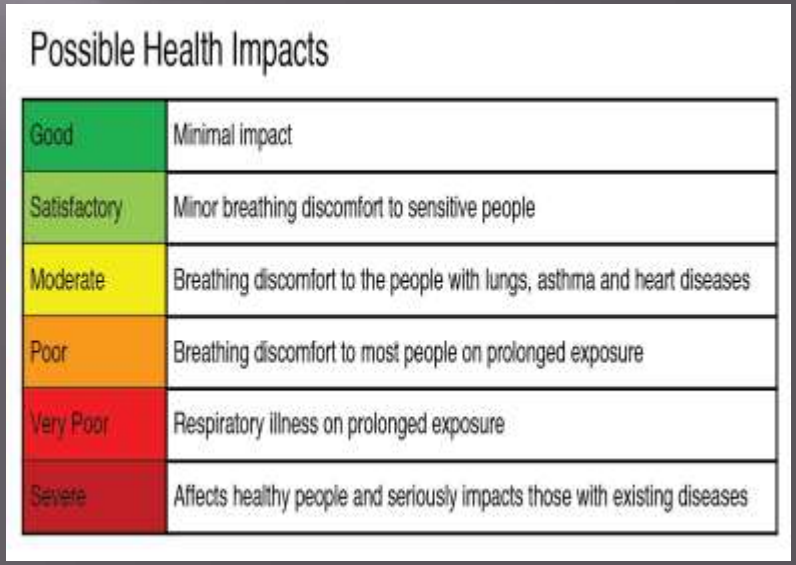
Status of Monitoring and Air Quality Data

NAQI – The National Air Quality Index

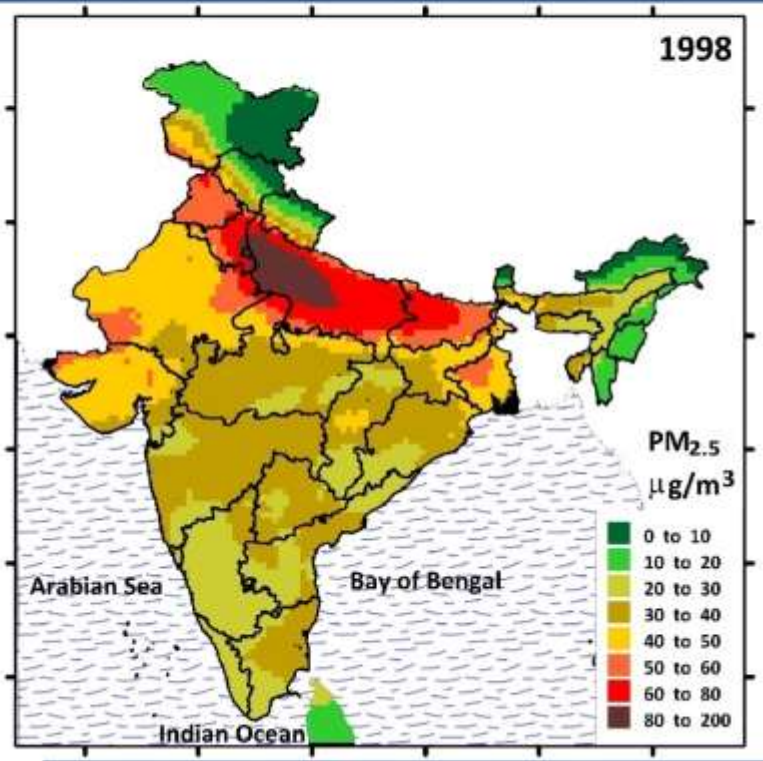
Daily Air Quality Index based on a composite score of 8 different parameters - Nitric Oxide, Nitrogen Dioxide, Oxides of Nitrogen, SO2, CO,O3

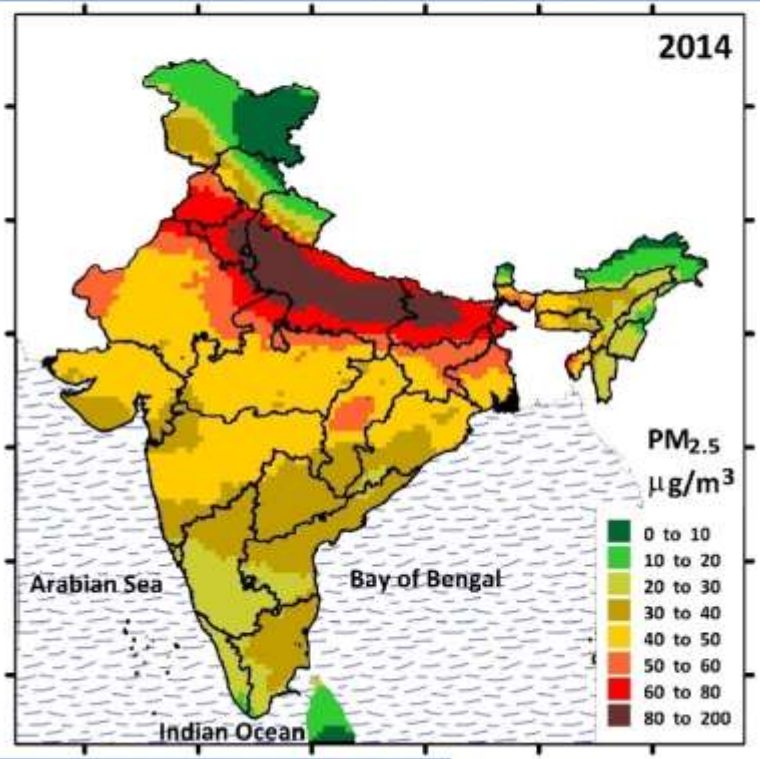
AQI Bulletin March 17, CPCB

City	Air Quality	Index Value	Prominent Pollutant	Based on number of monitoring stations
Agra	Poor	230	PM2.5	1
Delhi	Poor	221	PM2.5,PM10	8
Kanpur	Poor	254	PM2.5	1
Bangalore	Moderate	124	O3	2
Lucknow	Moderate	129	PM2.5, O3	3
Varanasi	Poor	230	PM2.5	1



$PM_{2.5}$ POLLUTION in INDIA 1998 vs. 2014





	#of districts above 10 µg/m³	#of districts above 40 µg/m³	maximum in µg/m³	all district average in µg/m³
1998	98%	40%	99.6	41.5
2014	99%	60%	110.8	48.8

Total # of districts 640 (census 2011)

India annual standard 40 µg/m³
WHO annual guideline 10 µg/m³

Gridded $PM_{2.5}$ data is constructed by combining data from satellite retrievals and a 3D global chemical transport model, and subsequently calibrated with available ground-based observations
(Source: Dalhousie University - http://fizz.phys.dal.ca/~atmos/martin/?page_id=140)

UE info

The Problem in Indo-Gangetic Plain

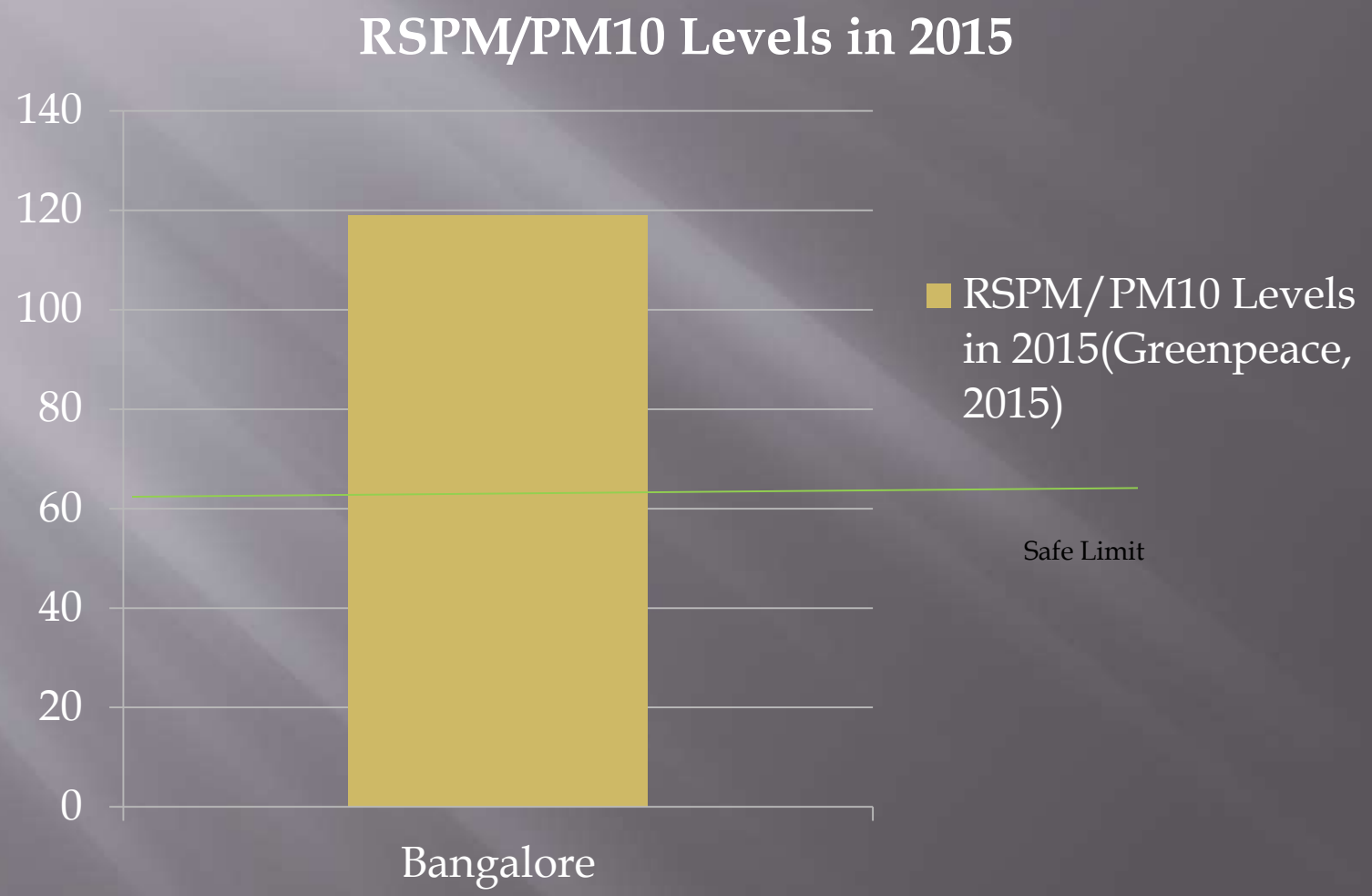
Severe Air Pollution Levels during winter

Atmospheric Inversion

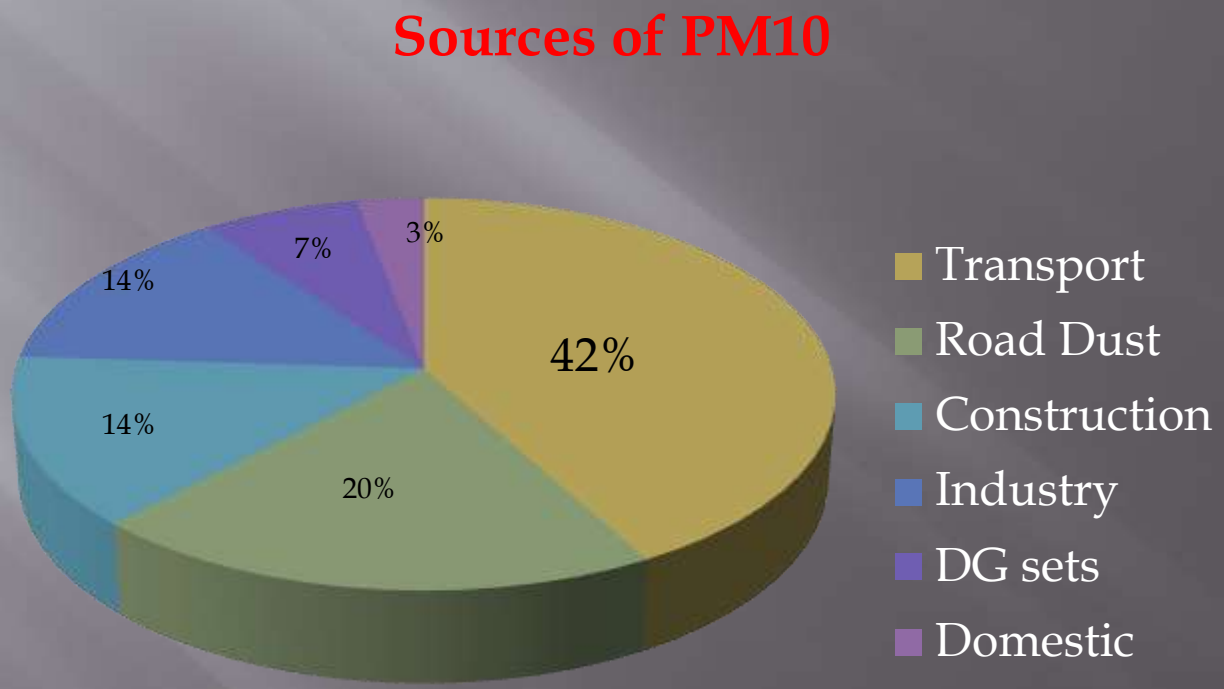
Regional Problem, long-range transportation of pollutants

Key sources include – Biomass, Coal, Bricklins, Vehicles

FOCUS : BENGALURU



TERI 2010 estimated emission load and source contribution to pollution for Bangalore and estimated that, "At the city level, the major sources of PM10 emissions are transport (42%), road dust resuspension (20%), construction (14%), industry (14%), DG set (7%) and domestic (3%).



Likewise, at the city level, major sources of NOx are transport (68%), DG set (23%), industry (8%) and domestic (1%). In case of SO2 , at the city level, industry (56%0, DG set (23%) and transport (16%) are the major sources.

MONITORING STATIONS – Online

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- BTM
- PEENYA
- BWSSB Kaddabasanahalli
- KSPCB Sghalli
- CITY Railway Station

- AQI Bullentin at 4pm everyday

Unlike Delhi, Bangalore does not have an air pollution action plan

The annual averages for PM 2.5 and PM10 for Bangalore and Delhi are not very different

More robust monitoring with health advisories and city-specific studies are needed