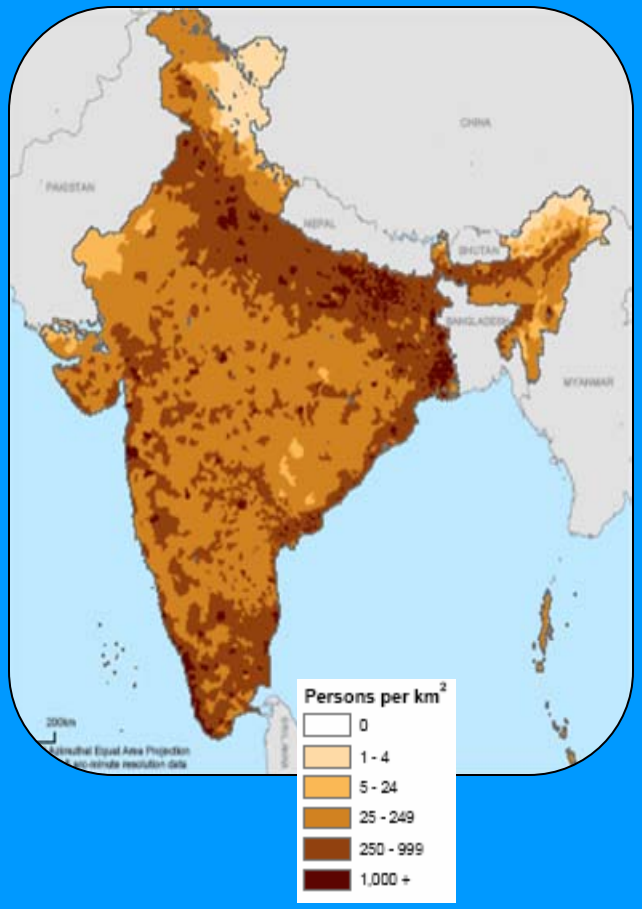
Emerging Opportunities to Capitalize on Co-benefits of Urban Pollution and Global Climate Policy

Dr. Sarath Guttikunda

Founder @ UrbanEmissions.Info
New Delhi, India

National Research Conference on Climate Change,
IIT Delhi, New Delhi, India, March 5th, 2010

What makes India more susceptible to Climate Change?



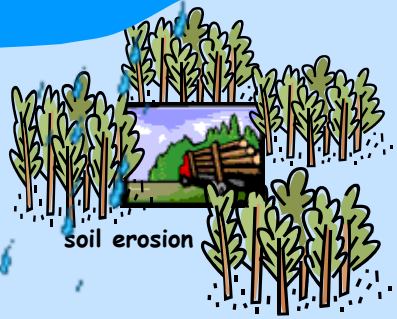
- Densely populated
  - Substantial poverty
- Large coastal populations
  - Mostly urban
- Diverse climatic zones
- Diverse economy with critical climate dependant sectors
  - agriculture
- Low-lying areas susceptible to extreme events

Host of Urban Problems

Tropospheric ozone, aerosols, greenhouse gases

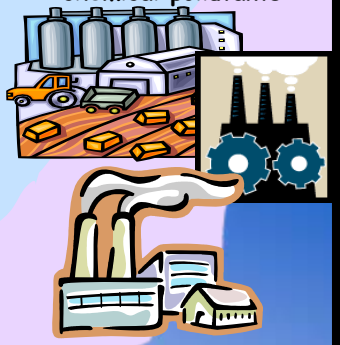
acid rain

groundwater contamination



soil erosion

Toxics, chemical pollutants



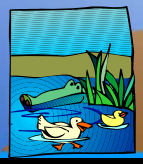
industrial wastes

agricultural runoff

urban air pollution

agricultural pesticides

surface water pollution

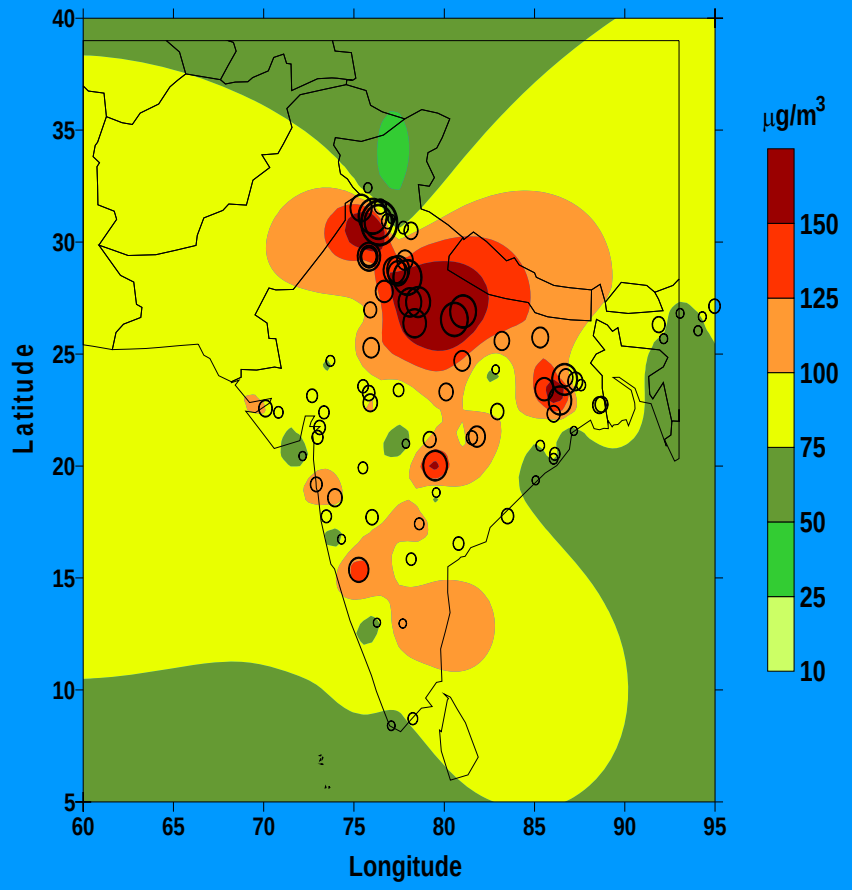


vector-borne disease

indoor air pollution

A. Acharya

PM_{10} Pollution in India

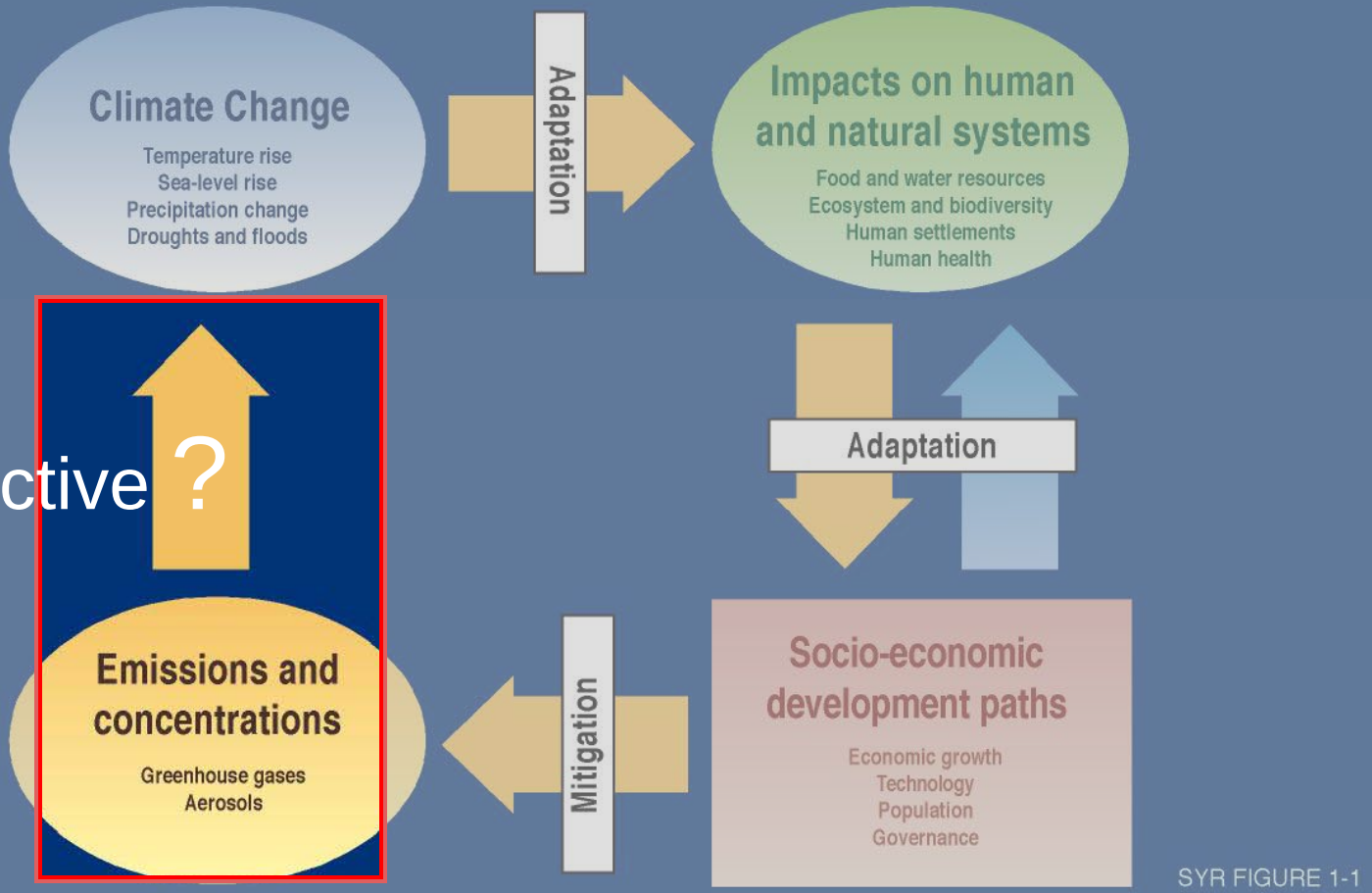


In 2008

- 40% of the cities exceeded the PM health standards for outdoor air pollution
- An estimated ~300,000 premature deaths a year and a large number of morbidity cases

Source: SIM-air Series No.27 "PM Pollution in India"

Climate Change - an integrated framework



Local perspective ?

SYR FIGURE 1-1

Mail India
March 1st, 2009

Capital has more toxic particles in its air than other major Indian metros

DELHI IS INDIA'S ASTHMA CAPITAL

DELHI has the highest levels of Respirable Suspended Particulate Matter (RSPM) among the four metros, exposing its residents to a greater risk of asthma than people elsewhere in the country.

By **Meenal Dubey** in New Delhi

Acceptable levels of RSPM should not be more than 60 microgram (mg) per cubic meter (cu m) annually. In 2008, Delhi's RSPM was recorded at a shocking 149 mg/cu m, according to a report published by the Central Pollution Control Board (CPCB) with the help of data collected between January and August 2008.

This is well above Mumbai's RSPM mark of 118 mg/cu m, Kolkata's 104 mg/cu m and Chennai's 54 mg/cu m.

It is no secret that India's capital is highly

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Smoke alarm in Delhi

Continued from page 1

polluted; what's startling is the dangerous levels to which its air has been polluted leaving children vulnerable to respiratory disorders. Experts say this danger is showing no sign of abating.

That, in short, makes Delhi India's asthma capital. The reasons for this dubious distinction are not far to see. The city, with 5.5 million vehicles, handles far more traffic than all the other metros put together. More vehicles are added each day. This is a major contributing factor to the abnormally high concentration of pollutants in the air.

RSPM is made of air-borne particles bigger than 4 to 5 microns, which get attached to the nasal membrane and are prevented from entering the lungs. However, if these particles are smaller, they do not get blocked by the nasal tract, thus entering the lungs and causing various diseases. Combustion, burning of fossil fuels, vehicular pollution and emissions from power plants are the main sources of RSPM.

Anhumita Roy Chaudhury, associate director at the Centre for Science and Environment (CSE), said, "The almost mindless addiction of vehicles on the city's roads and the lack of a proper policy to counter this are adding to pollution."

'Vehicles are the main culprits for the high RSPM levels'

Construction activity also adds pollutants, but Delhi did not see significant construction activity last year to contribute to pollution. "Vehicles are the main culprit for the high RSPM levels," Roy Chaudhury said. It does not help that 18,000 trucks from other states enter Delhi everyday and add to the pollution levels.

She added, "Mumbai and Kolkata have a better public transport system. People there invest in car pools, while the bus, local train and tram systems are sound. Though the Metro has made some difference to Delhi, the city still has miles to go as far as pollution control is concerned."

The rise in the number of diesel vehicles has also dented Delhi's efforts to curb its RSPM levels.

CPCB member secretary J.S. Kamyotra said Delhi's pollution levels are monitored through two methods: manually and by continuous methods at monitoring stations located across the city. "For instance, at high-density traffic areas such as ITO, RSPM levels are measured on all 365 days using both methods. At other locations we measure these levels at least twice a week."

The question though is that for a city that pioneered CNG usage, why are RSPM levels high? A senior CPCB official said: "Delhi has only one lakh CNG vehicles. The other 5.4 million vehicles are non-CNG. Is it any surprise that the city is polluted?"

Kolkata has the highest levels of nitrogen oxide (NO) levels at 63 mg/cu metre, while in Delhi it is 43 mg/cu metre in 2008. This is a significant increase from 2007, when it was 36 mg/cu metre. Acceptable value of NO is 60 mg/cu metre. NO pollution affects the respiratory system causing bronchitis and damage to lung tissue.

The only good news in the CPCB report is that all four metros have done well to control sulphur dioxide (SO_2) pollution. While the acceptable level is 60 mg/cu metre, Mumbai has 8 mg/cu metre, followed by Chennai and Kolkata at 7 mg/cu metre, while Delhi has the lowest at 4 mg/cu metre.

SO_2 reacts with other chemicals in the air to form tiny sulfate particles. Coal burning, smelting, manufacture of sulphuric acid, conversion of wood pulp etc. contribute to SO_2 pollution. When these particles are inhaled, they gather in the lungs and are associated with respiratory tract diseases, difficulty in breathing, and in extreme cases, premature death.

Govt says things will improve in 3 years

A senior government official said the government has given the nod to cleaner and better fuels, usage of Euro IV compliant in vehicles and also a revamp of the public transport system. "The Delhi Metro is a step in that direction," the official said. "Things will begin to improve in the next three years and the changes will be there for everyone to see."

meenal.dubey@mailtoday.in

See what you breathe

A LOOK AT THE AMOUNT OF POLLUTANTS IN THE CAPITAL'S AIR

Respirable Suspended Particulate Matter (RSPM)

City	2006	2007	2008 (Jan-Aug)
Delhi	136	159	149
Kolkata	100	99	104
Mumbai	86	92	118
Chennai	57	37	54

Sulphur Dioxide (SO_2)

City	2006	2007	2008 (Jan-Aug)
Delhi	9	4	4
Kolkata	7	8	7
Mumbai	9	11	8
Chennai	7	9	7

Nitrogen Oxide (NO)

City	2006	2007	2008 (Jan-Aug)
Delhi	43	36	43
Kolkata	53	58	63
Mumbai	29	40	34
Chennai	10	9	10

The figures are annual and should not exceed 60 microgram per cubic metre of air

MAIN CULPRITS

80,000 vehicles which enter Delhi from the National Capital Region daily. These include diesel-guzzling SUVs that emit thick smoke

18,000 trucks which enter city every day

Children suffer

The Capital's polluted air is harming its children the most, with asthma cases rising among them

- The number of children with asthma has doubled over the past decade in the Capital
- Doctors blame the high levels of RSPM in the air for the attacks
- Dust and construction work squirt RSPM into the air. But those spewed by vehicles are the most harmful because of their small size
- RSPMs larger than 10 micrometres can't go past the nose or throat because of their size, but those less than one micrometre easily enter lungs
- Children are more susceptible to RSPMs than adults as they spend more time outdoors
- With their heart beating faster, children playing outdoor games tend to inhale more RSPMs

Cities: A Problem & Solution

Energy Demand

Industries

Waste

Transport

Domestic

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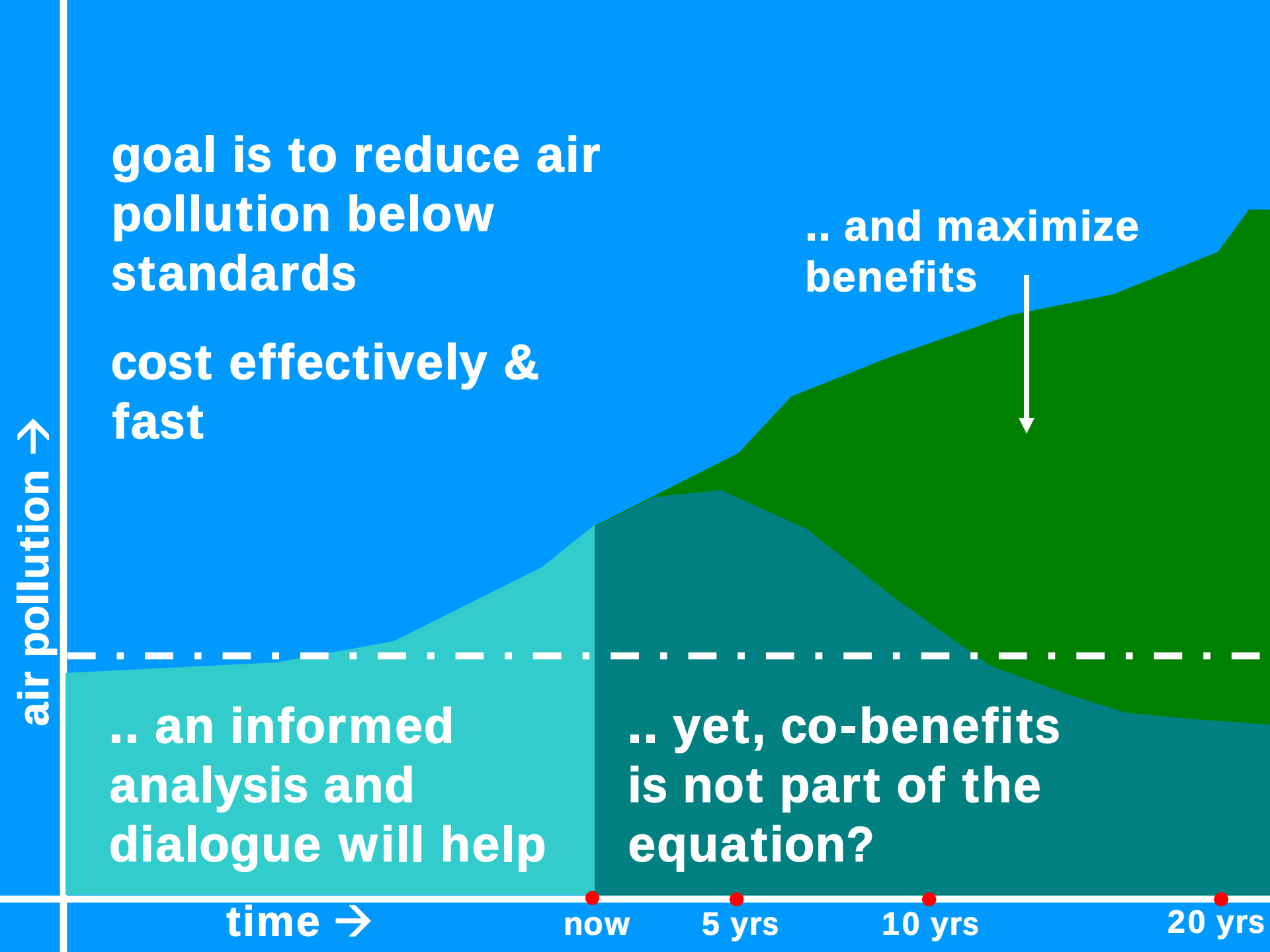
Renewables

Efficiency

Management

Buses/NMT

Cleaner Fuels


goal is to reduce air pollution below standards
cost effectively & fast
.. and maximize benefits
air pollution →
.. an informed analysis and dialogue will help
.. yet, co-benefits is not part of the equation?
time →
now
5 yrs
10 yrs
20 yrs

It is all in the Definition

An integrated approach for “co-benefits” could be in the common and world-wide accepted definition of “air pollution”, which refers to

- all kind of pollutants (primary and secondary)
- all kind of sources (anthropogenic and natural)
- all kind of consequences (short- and long-term, short- and long-distance, direct and indirect, public health and ecosystem).

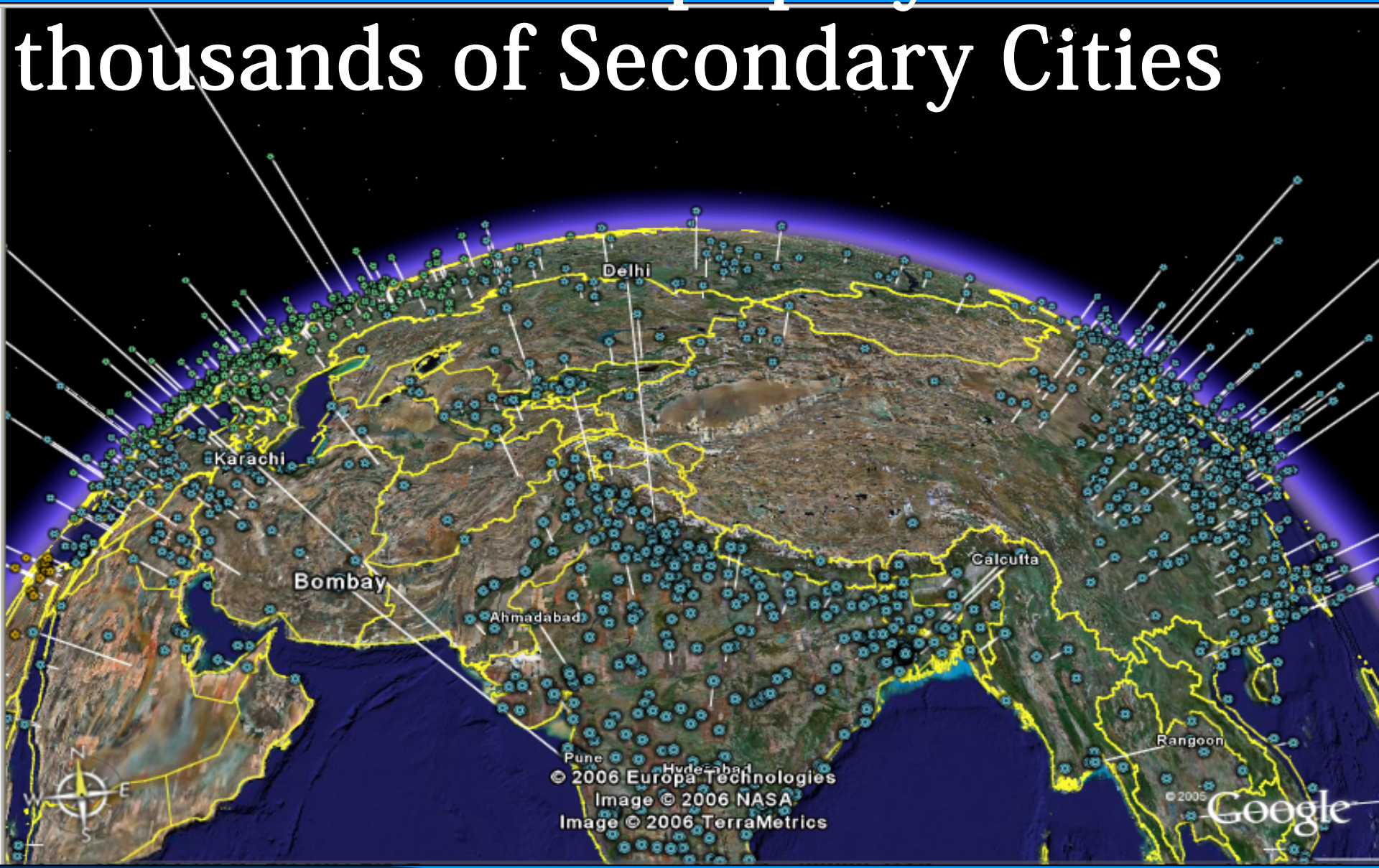
Opportunities for Co-Benefits

- Clean fuel for domestic sector
  - Indoor air pollution & black carbon
  - Heating only boilers to central heating
- New technologies for power plants
- Fly ash control to brick making
  - Approved CDM methodologies
- EE for building material
  - Brick & Cement
- Transport sector
  - Non-motorized transport
  - Clean fuels
  - Maintenance programs

Stumbling Blocks

- Comprehensive planning
- Coordination
- Scale-ups
- Replication of best practices
- Multi-sectoral Information

300 cities >2 m pop by 2025 +
thousands of Secondary Cities



Source: Google Earth & www.demographia.org

Thank you

Dr. Sarath Guttikunda
@ www.urbanemissions.info
New Delhi, India

March 2010