

International Forecasting Perspectives
IWAQFR-2011, Wasington,DC

PERSPECTIVE
FROM
INDIA

Gufran Beig
Indian Institute of Tropical Meteorology, Pune, India

SYSTEM OF AIR QUALITY FORECASTING & RESEARCH (SAFAR-India)



Gufran Beig (Program Director)

Indian Institute of Tropical Meteorology, Pune
(Ministry of Earth Sciences, Govt. of India)

MISSION GOAL

- **Develop and dedicate the System of Air Quality Forecasting & Research (SAFAR) to nation as an operational service in 7 Indian Metropolitan cities namely- Delhi, Pune, Ahmedabad, Mumbai, Kolkata, Chennai and Hyderabad.**
- **Synthesizing the air quality and health data, enhancing capacity building and developing the air quality health forecasting model to strengthen the national decision support system (DSS) through RCs.**

What is SAFAR ?

FORECASTING AIR OF TOMORROW

(O₃, NO_x, CO, PM_{2.5}, PM₁₀, BC, BTX)

(1) Weather Forecasting Model: Drives Air Pollutants

MUST: Monitor Weather Parameters (24x7)

WHY: Validating Forecast, Assimilate and Input back

(2) High resolution Emission inventories –Drives Forecast

(3) Air Quality Forecasting Model

MUST: Monitor Air Pollutants Strategically (24x7)

WHY: Validating Forecast , Assimilate and input back

(4) Reaching to Public

(a) Translate Data to Information;

HOW- Develop AQI Concept

(b) Issue Advisories & Alerts;

HOW- Advise on Health via AQI

Regional Responsibilities

1. SAFAR System Development and Scientific Research:

Indian Institute of Tropical Meteorology, Pune

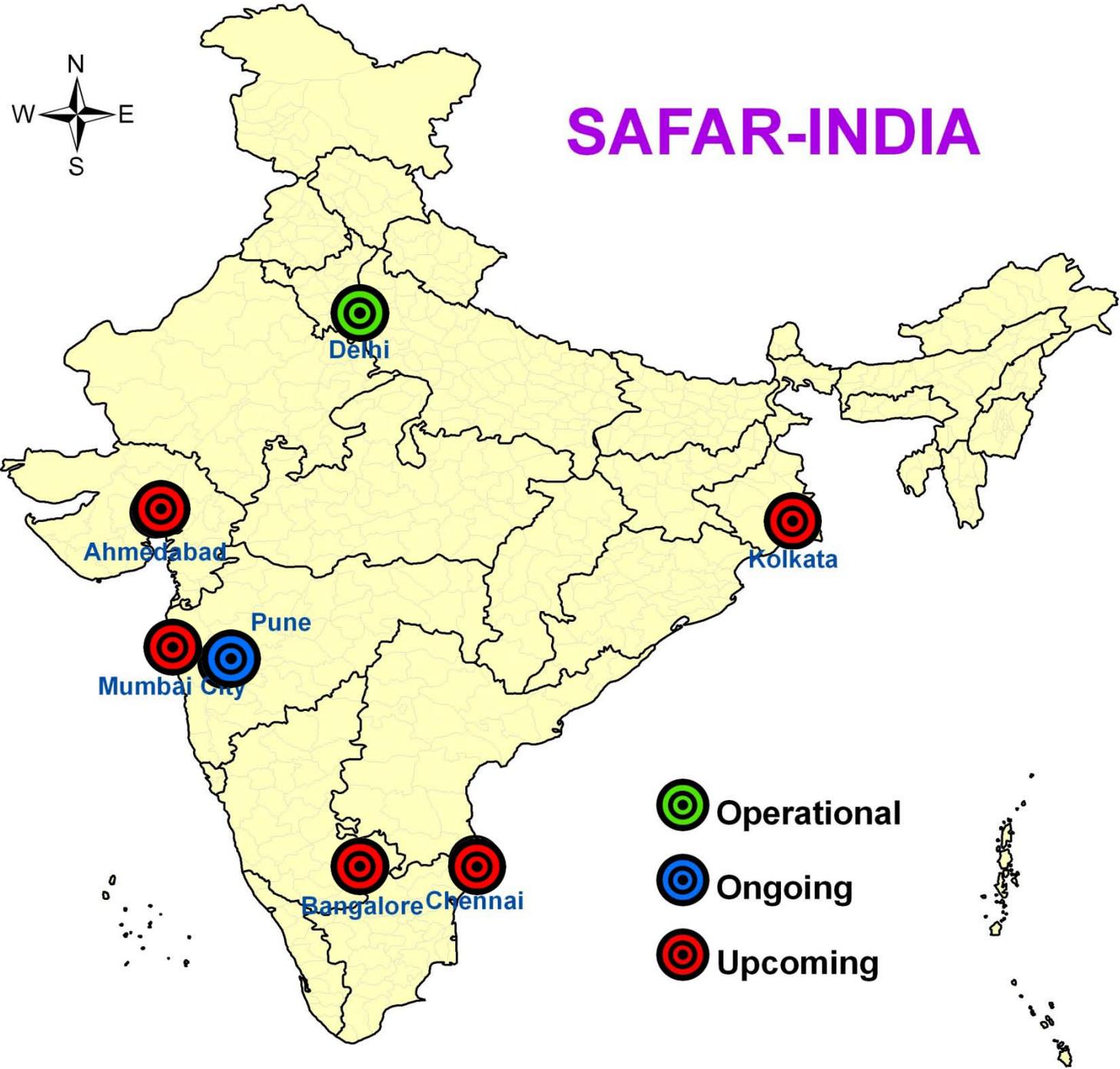
2. Weather Forecasting Skill & Assimilation:

NCMRWF, New Delhi

3. Operational Services of SAFAR:

India Meteorological Department, New Delhi

SAFAR-INDIA



Pride of India -Mega Sports Event Begins

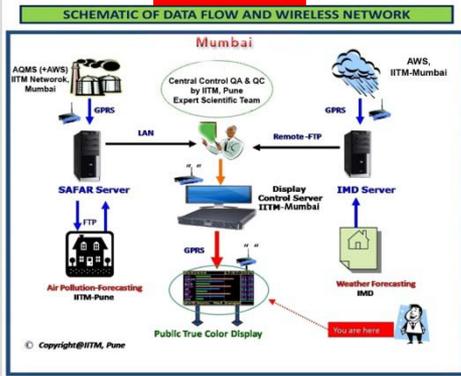


SAFAR Components -At a Glance

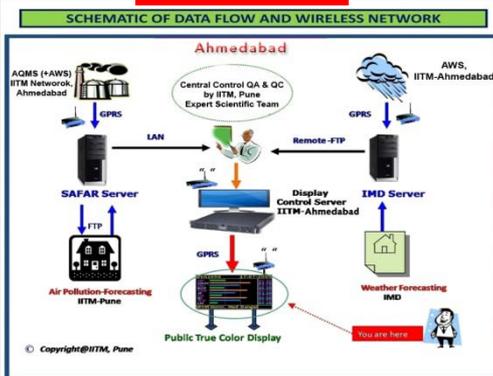
M30



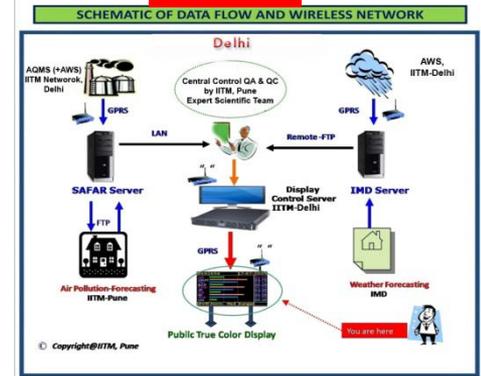
Mumbai



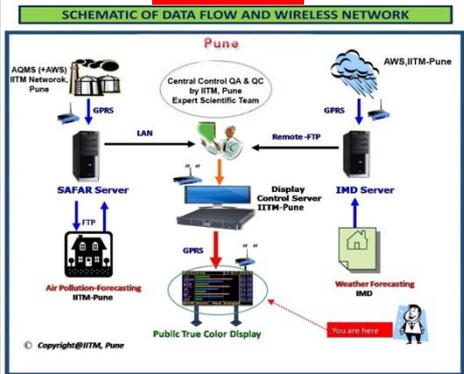
Ahmedabad



Delhi



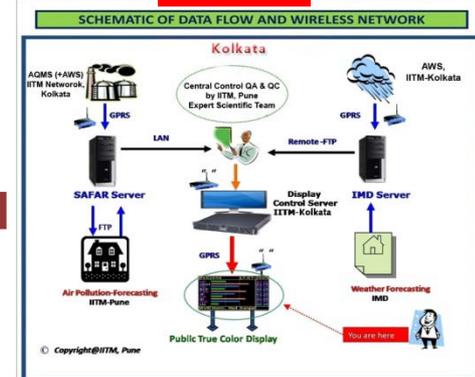
Pune



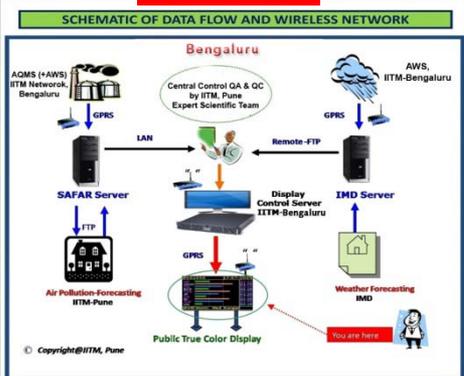
Online AQMS Data Input



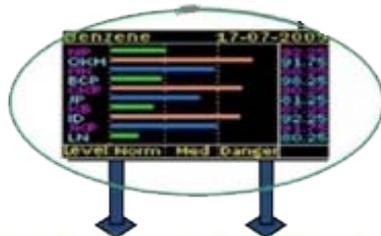
Kolkata



Bengaluru

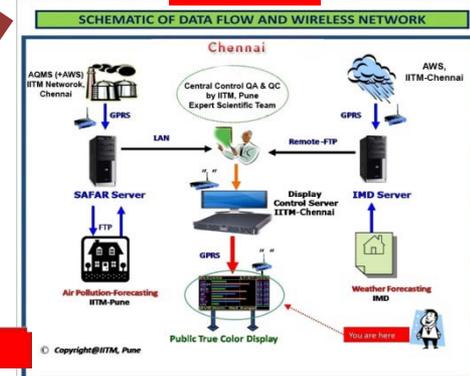


Regional Control Center -PUNE



Public True Colour Display

Chennai



You are here

AQMS and AWS installed at Venues



Monitoring Station-
Outer View



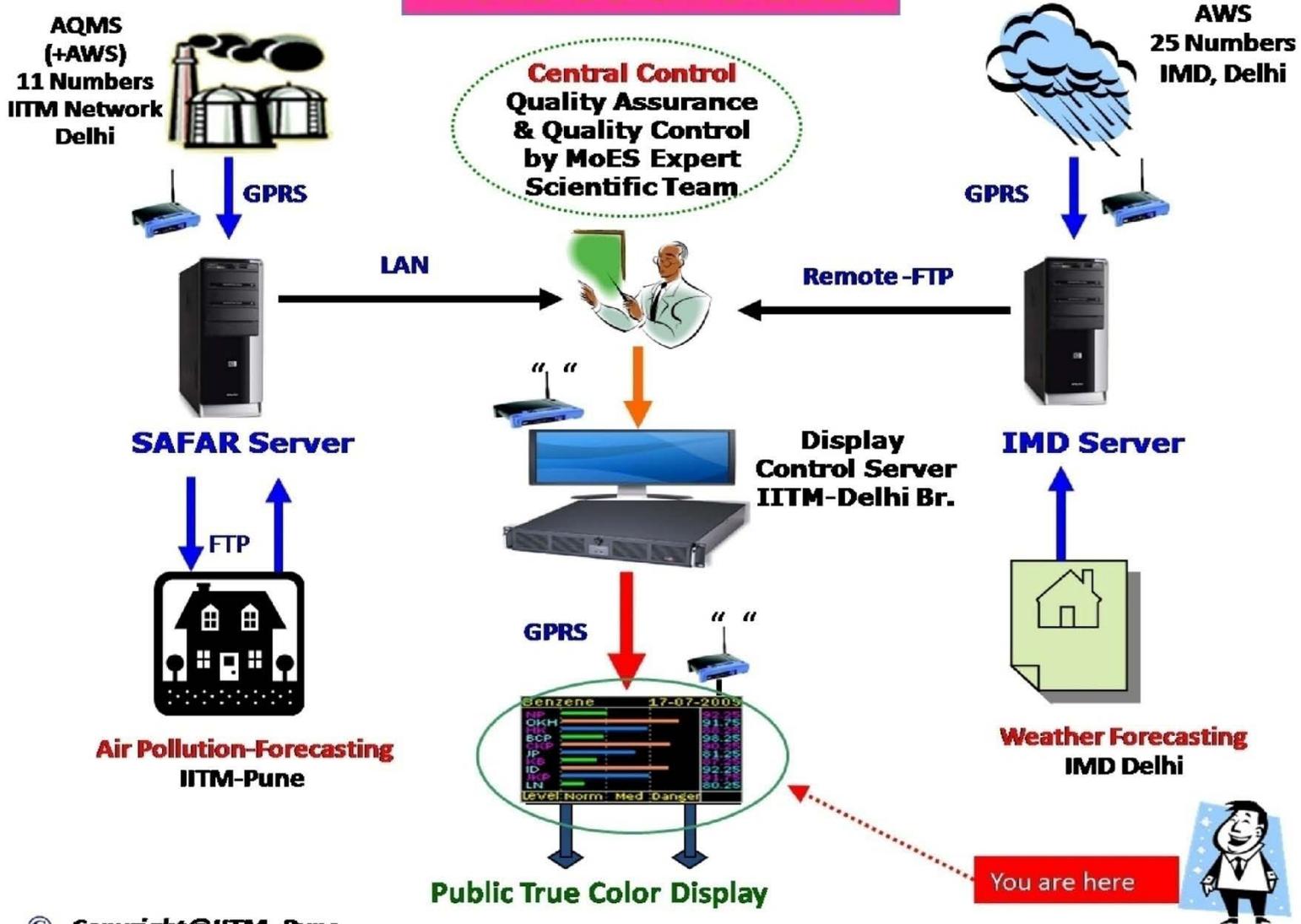
Control Room

Monitoring Station-
Inner View

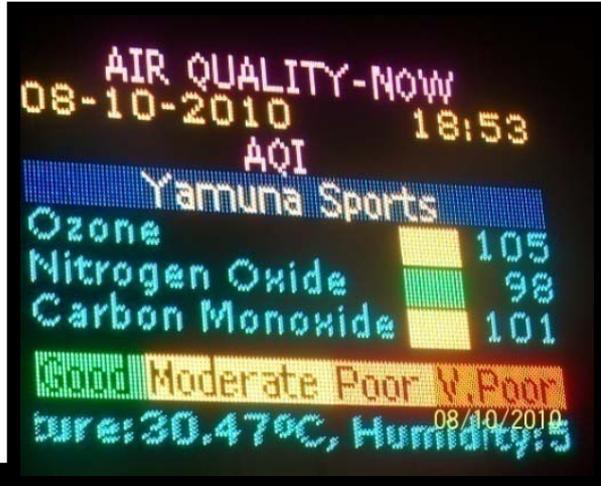
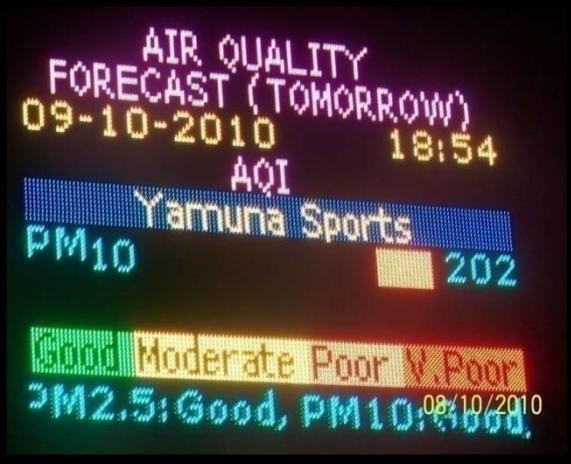


SCHEMATIC OF DATA FLOW AND WIRELESS NETWORK

MoES-OC-CWG-2010









System for Air Quality Forecasting & Research for Commonwealth Games 2010

Ministry of Earth Sciences, Govt. of India
Indian Institute of Tropical Meteorology, Pune



"India's first Air Quality Forecasting System SAFAR has been inaugurated and dedicated to the nation by Dr. Shailesh Navak, Secretary, Ministry of Earth Sciences

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- [Safar Set up +](#)
- [Monitoring Stations](#)
- [Modeling System](#)
- [Digital Display Screens](#)
- [Pollution: General Idea +](#)
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- [Gateway: Air Quality online](#)
- [International Recognition](#)
- [Weather Forecast IMD, New Delhi](#)

Mission

Indian Institute of Tropical Meteorology (IITM), Pune, a constituent under the Ministry of Earth Sciences, Government of India, is spearheading country's first major initiative named as "**System of Air Quality forecasting and Research (SAFAR)**". It has been successfully tested during the commonwealth Games 2010 for National Capital Region Delhi. Our vision is to spread the SAFAR to other major cities in India and to put our country in frontiers of Air Quality Forecasting Research.

The SAFAR provide location specific information on Air Quality in near real time and its forecast 24 hours in advance. It is complemented by the weather forecasting system designed by IMD, New Delhi. The ultimate objective is to increase the awareness among general public regarding the air quality in their city well in advance so that appropriate mitigation action and systematic measures can be taken up for the betterment of air quality and related health issues.



Air Quality Forecast



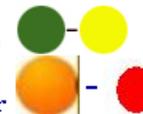
Current Weather

Temperature:NA Humidity:NA Wind Speed:NA Wind Direction:NA M. Dhyan Chand N

Air Quality Forecast for tomorrow in Delhi

Gaseous Pollution: Good To Moderate

Particulate Pollution: Poor To Very Poor



Latest News

(2) Release of "Emission Inventory of NCR-Delhi" Report

(3) Release of AQI report.

-->Press Release-MoES

-->Press Release OC-CWG

CWG: Air quality monitoring system launched

Photo Gallery



Designed by: Aparna Deshpande & Shardha Kale

Maintained by: Anil Pandey





System of Air Quality Forecasting & Research for Commonwealth Games 2010
Ministry of Earth Sciences, Govt. of India
Indian Institute of Tropical Meteorology, Pune

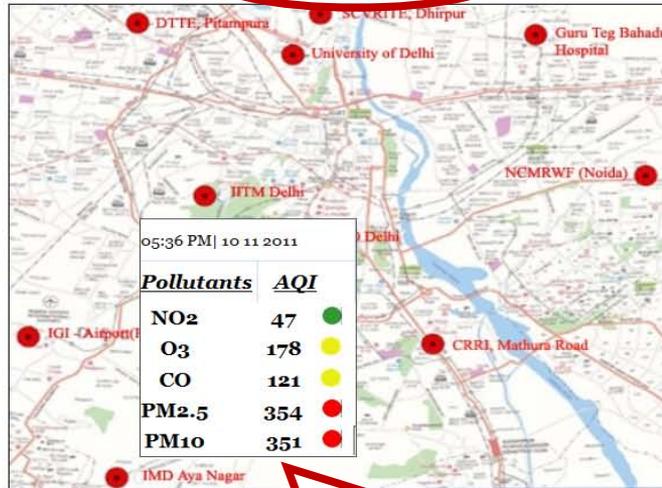


The Summary of Air Quality Status during Commonwealth Games Released [See more details...](#)

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- Pollution: General Idea +
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Online Visualization
AQI Current | **QI attributes are shown below in terms of** | Tomorrow's Forecast

Air quality Forecast



Good

Moderate

Poor

Very Poor

Very Unhealthy

Latest News

- "The Summary of Air Quality Status during Commonwealth Games Released"

Past News>>



Designed by: Aparna Deshpande & Shashika Kale
Maintained by: Anil Pandey

Air Quality in terms of AQI



123912



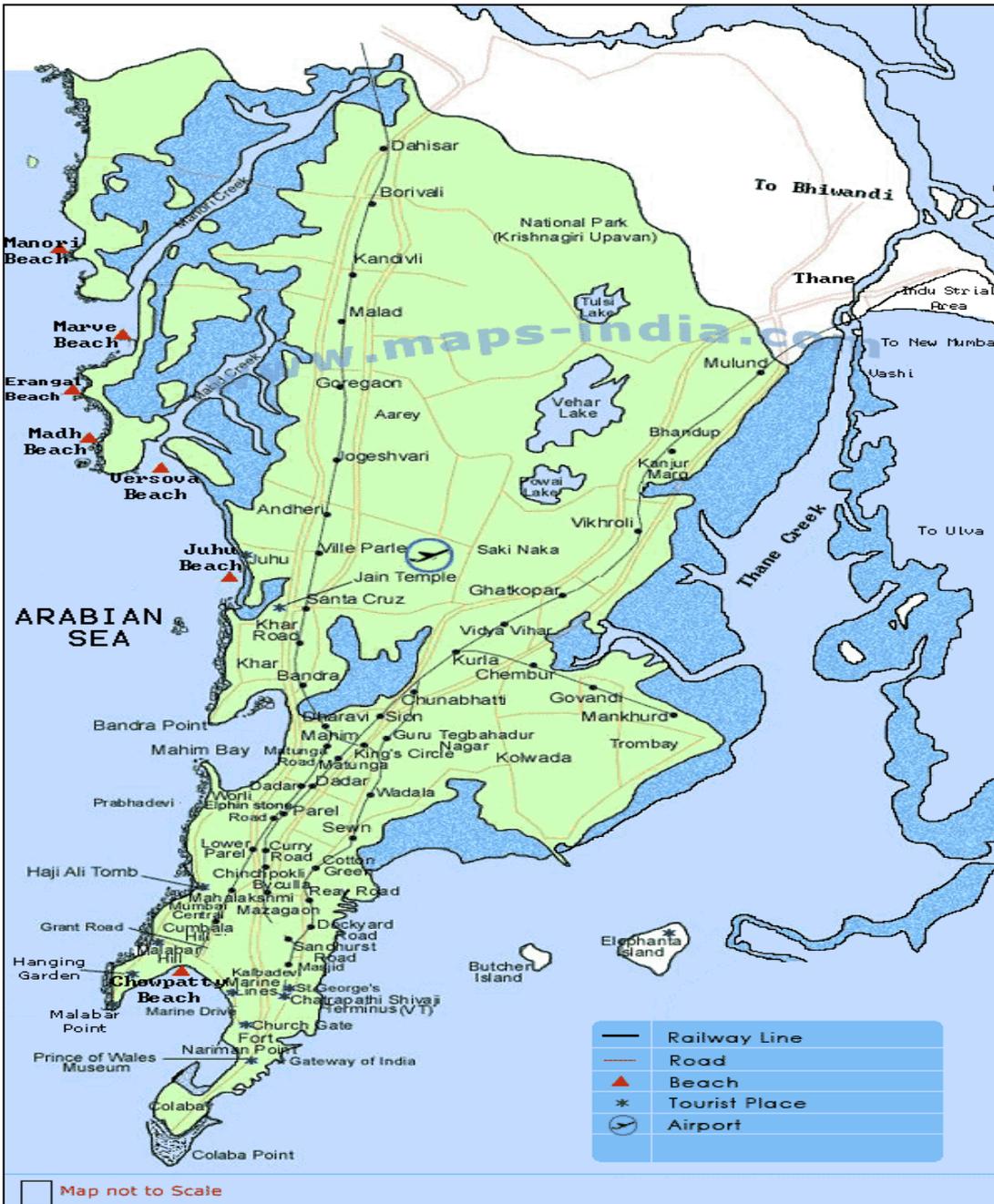
Delhi

Area : 1483 Km²
Density 2001 : 9294
Density 1991 : 6352
House Hold : 2554149
Population 2011 : 18451000

AQMS Network of SAFAR at
Delhi for CWG-2010

LED (Outdoor) Display Network
of SAFAR at Delhi for CWG-2010





Mumbai , Maharashtra

Area : 69 Km²

Density 2001 : 21190

Density 1991 : 20222

House Hold : 19063149

Population 2011 : 3873827





Pune , Maharashtra

Area : 15643 Km²

Density 2001 : 462

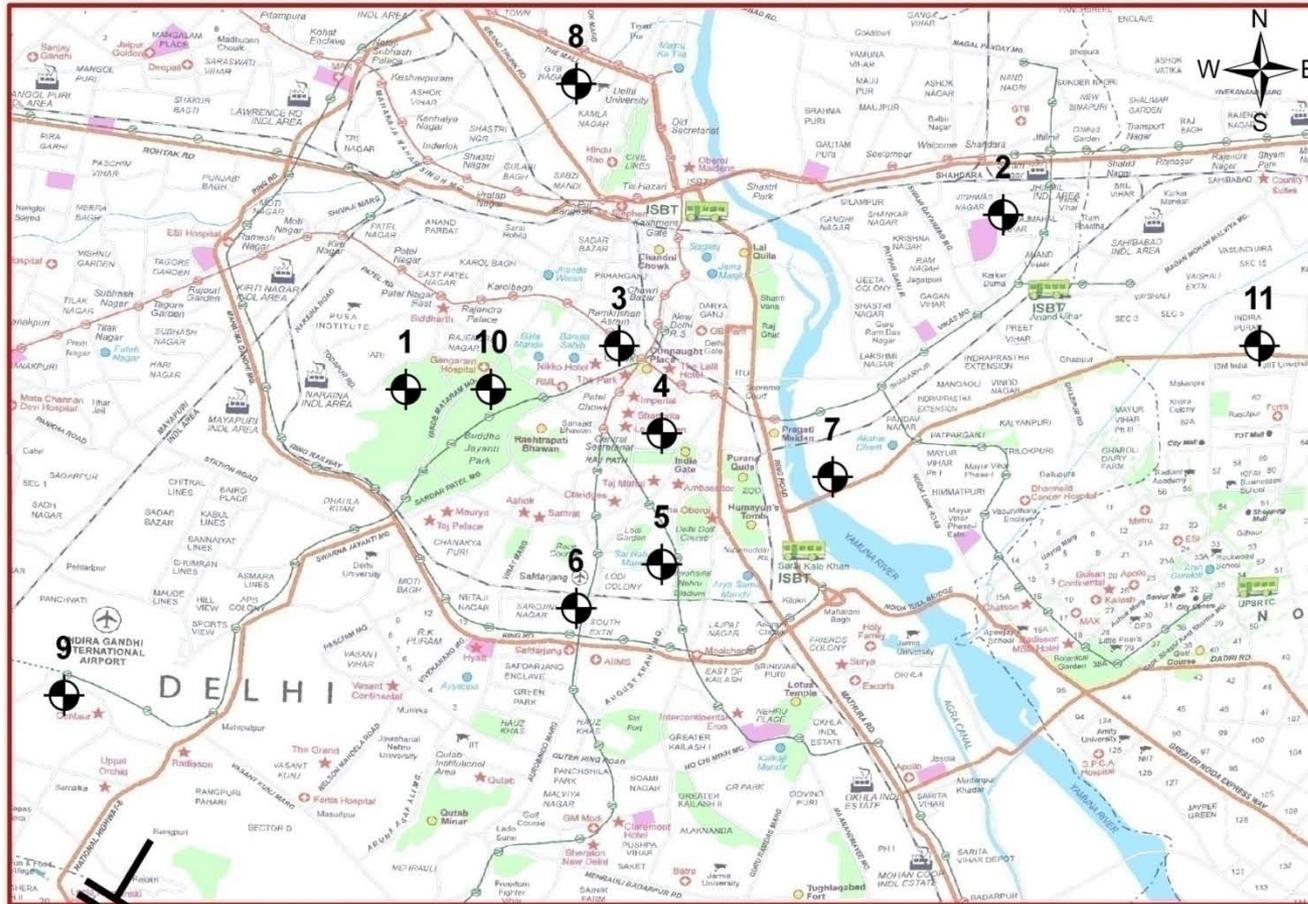
Density 1991 : 354

House Hold : 19063149

Population 2011 : 8412012



AQMS Network of SAFAR at Delhi for CWG-2010



AQMS Locations

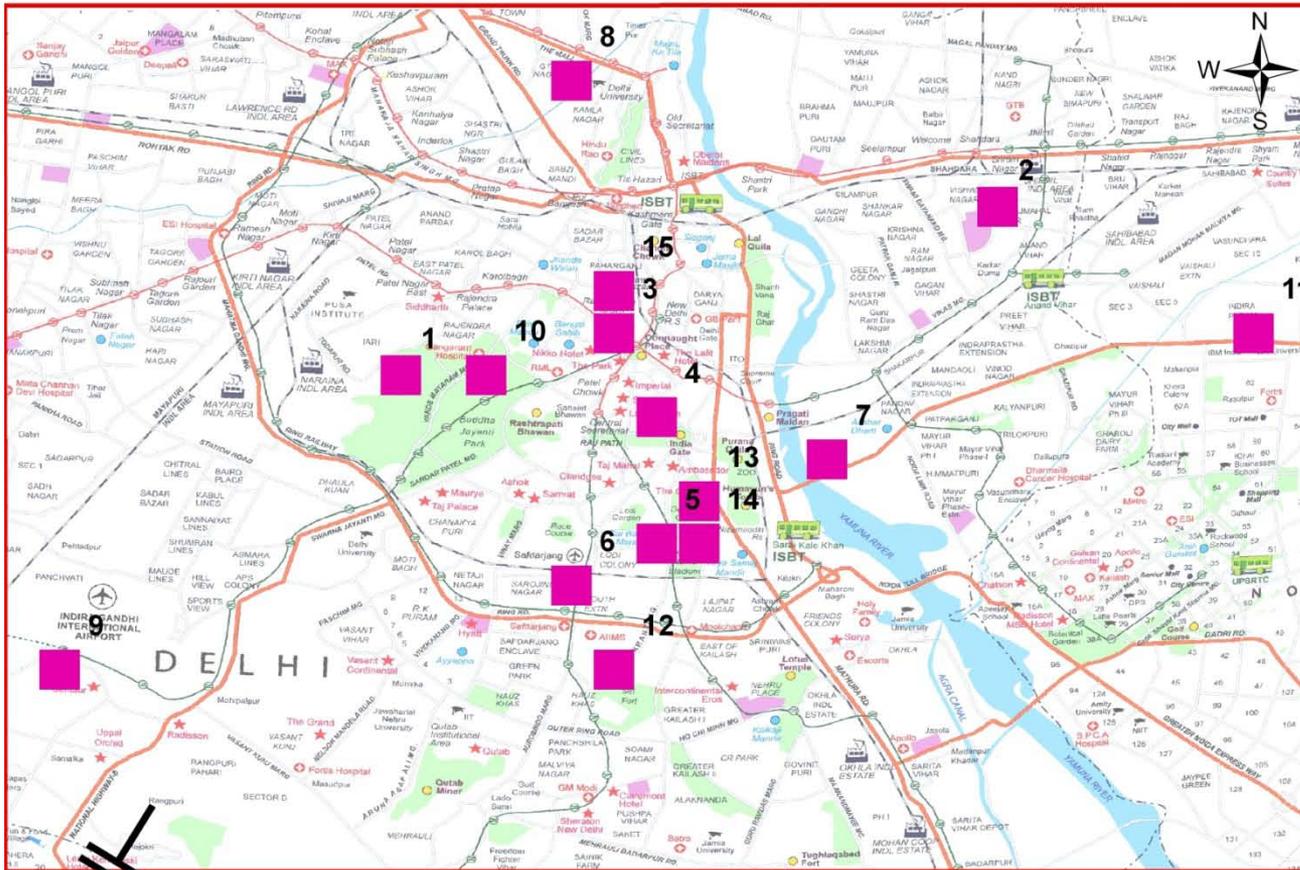
- 1. IITM Delhi (Pusa)
- 2. Yamuna Sports Complex
- 3. Indira Gandhi Sports Complex
- 4. M. Dhyan Chand National Stadium
- 5. Jawaharlal Nehru Sports Complex
- 6. Thyagaraj Sports Complex
- 7. Common Wealth Game Village
- 8. University of Delhi
- 9. IGI - Airport (Palam)
- 10. Talkatora Garden (TS + SPMS)
- 11. NCMRWF (Noida)
- 16. IITM Pune

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LED (Outdoor) Display Network of SAFAR at Delhi for CWG-2010

LED -Display Locations

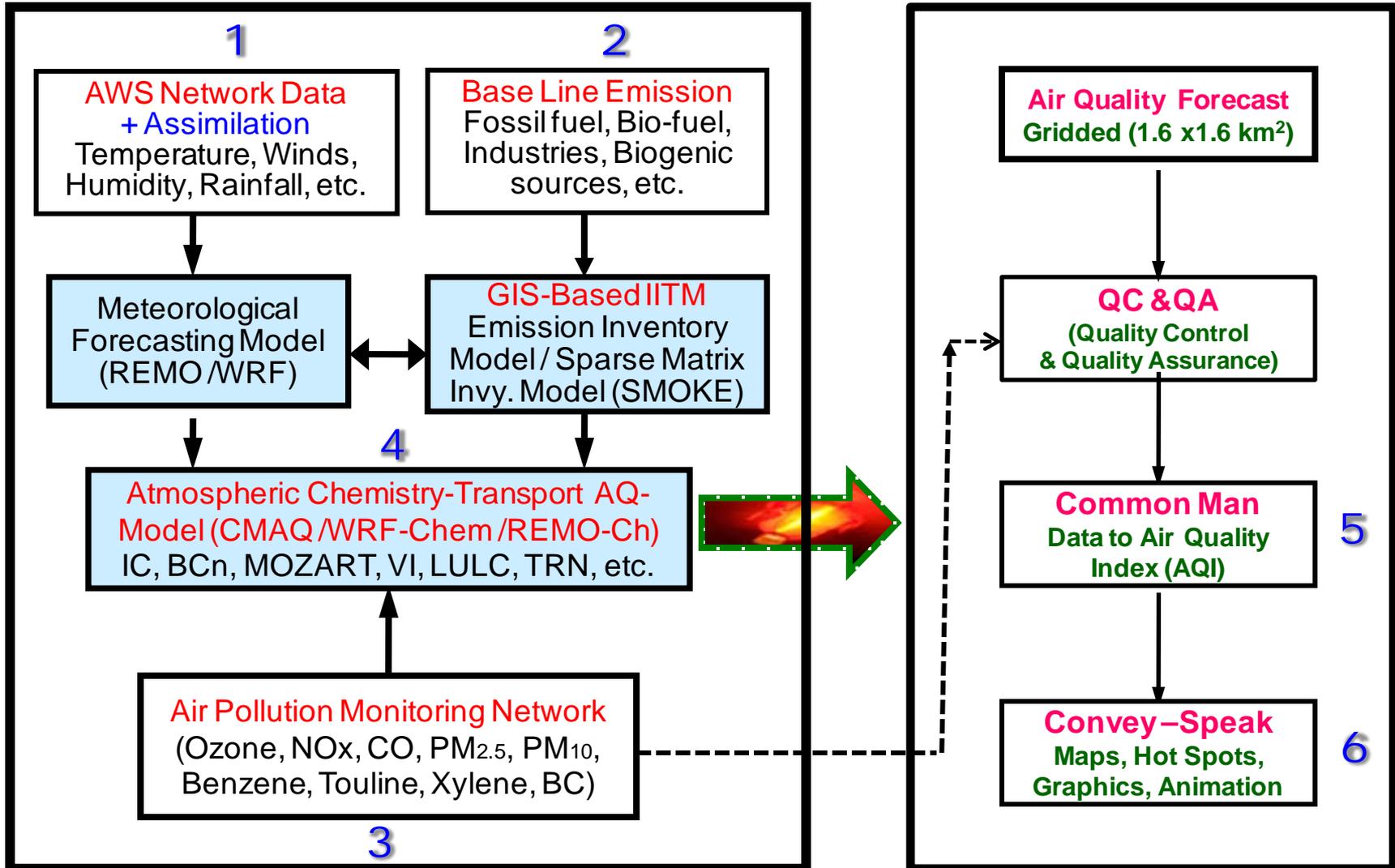


1. IITM Delhi (Pusa)
2. Yamuna Sports Complex
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6. Thyagaraj Sports Complex
7. Common Wealth Game Village
8. University of Delhi
9. IGI - Airport (Palam)
10. Talkatora Garden (TS + SPMS)
11. NCMRWF (Noida)
12. Siri Fort Sports Complex
13. IMD (Lodhi Road)
14. MoES -HQ (CGO Complex)
15. New Delhi Railway Station
16. IITM Pune

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SAFAR –Scientific -6 Air Quality Forecasting System



ATMOSPHERIC CHEMISTRY TRANSPORT FORECASTING MODEL

SYSTEM-1:

Meteorological Model -WRF

Emission Model –GIS based Statistical Model (EGIS)

Atmospheric Chemistry Transport Model –WRF-CHEM

Complete System: WRF-CHEM-EGIS

How to Communicate ?

Common Public

Need Simple Ways

***Let Colors and Numbers Speaks
Pollution and Health***

Like Ballot Paper

AIR QUALITY – NOW



Thyagaraj Stadium

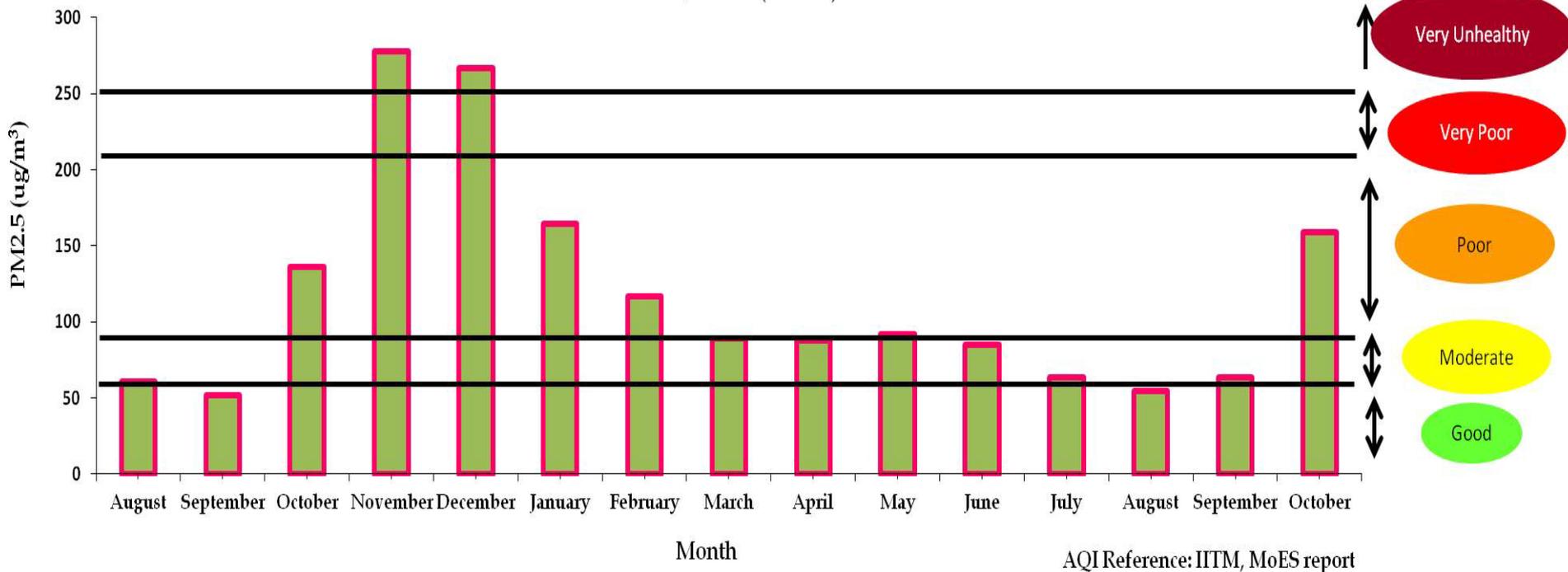
Date: 8th Oct. 2010

Time: 11:00 h

POLLUTANTS	AQI	Quality
Ozone	46	Good
Oxides of Nitrogen	107	Moderate
Carbon Monoxide	69	Good
Particulate Matter < 2.5 μ m	210	Poor
Particulate Matter < 10 μ m	120	Moderate

Air Quality of Particulate Matter $\leq 2.5 \mu\text{g}/\text{m}^3$ from 2010 to 2011 (Three Station Avg.- Delhi)

IITM, Pune (MoES) -SAFAR



MEN'S HOCKEY
PRELIMINARIES
INDIA VS AUSTRALIA



AIR QUALITY-NOW
08-10-2010 18:53
AQI
Yamuna Sports

Ozone	105
Nitrogen Oxide	98
Carbon Monoxide	101

Moderate Poor N. Poor
Temperature: 30.47°C, Humidity: 5

25:23
LE TISSOT

A23

INDIAN RAILWAYS

NTPC Limited

07/10/2010

LED Display at Jawaharlal Nehru Stadium (JNS)

वायु गुणवत्ता-अर्था
11-10-2010 12:07
AQI
पावन (भा.इ.मौ.वि.स)
पिएम 10 250
28.00%, Wind Speed: 1

Ministry of Earth Sciences
India Institute of Space and Terrestrial Physics
ISCTP-2010



TISSOT

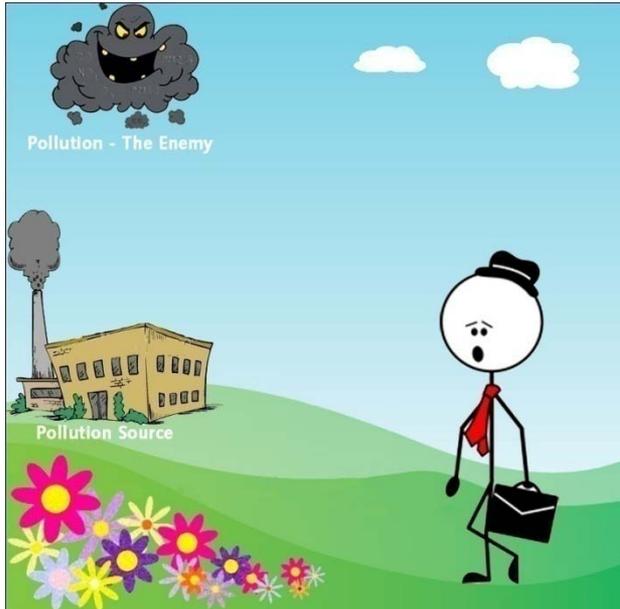
Communication to Public: Your MOOD → Stress Level



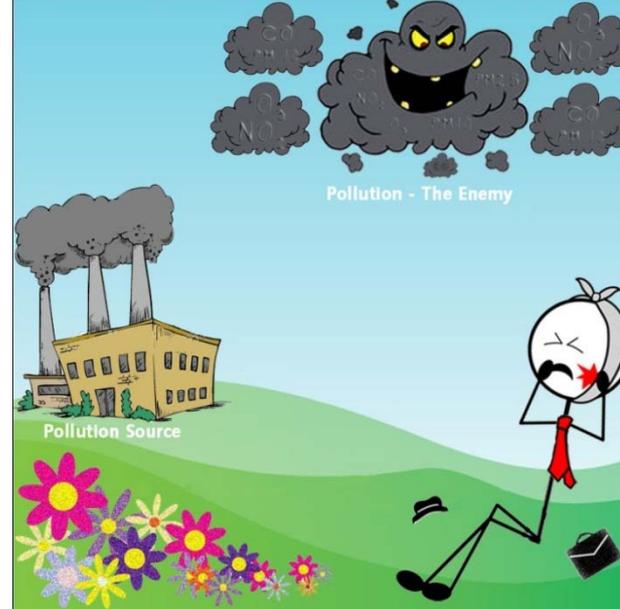
GOOD



POOR

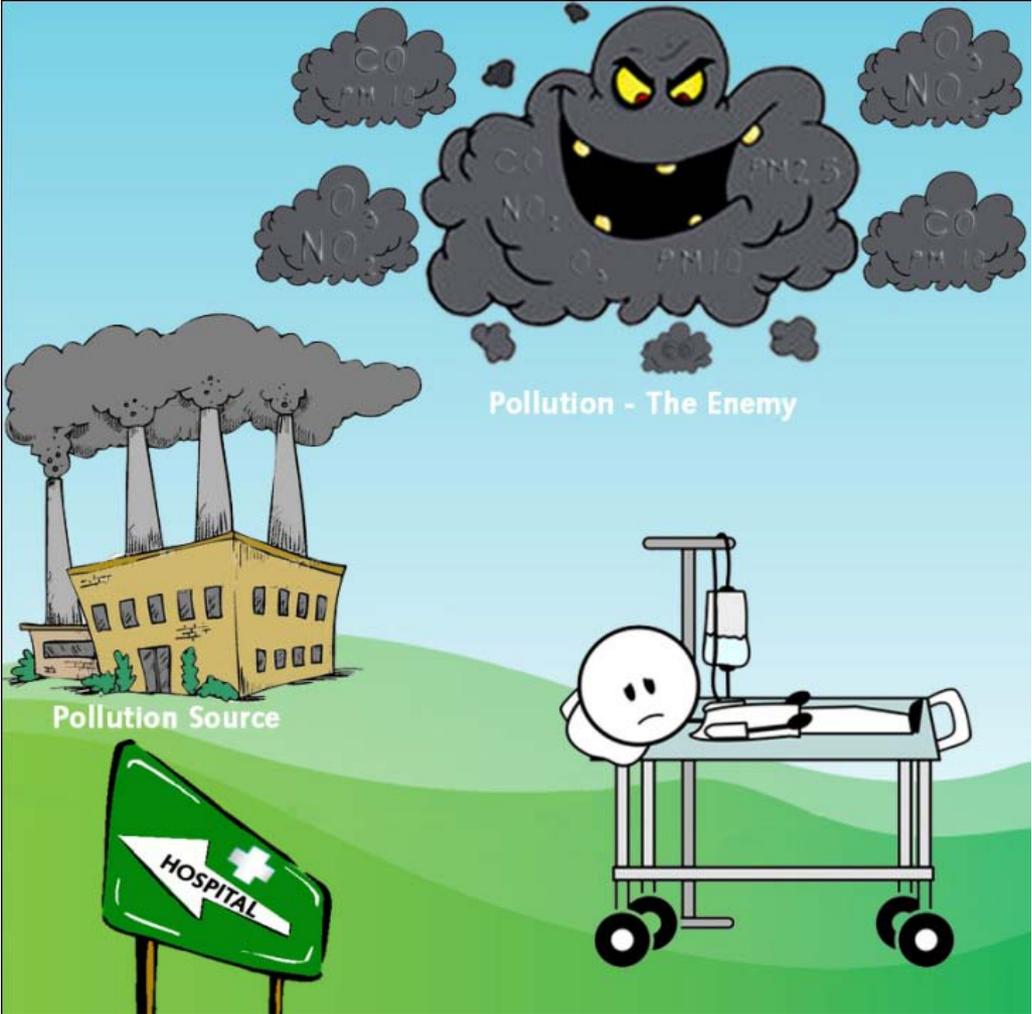


MODERATE



VERY POOR

Communication to Public: Your MOOD Stress Level



VERY UNHEALTHY

Communication to Public

Pollution MOOD ↔ How Fearful



GOOD

Co-operative



POOR

Angry



MODERATE

Upset

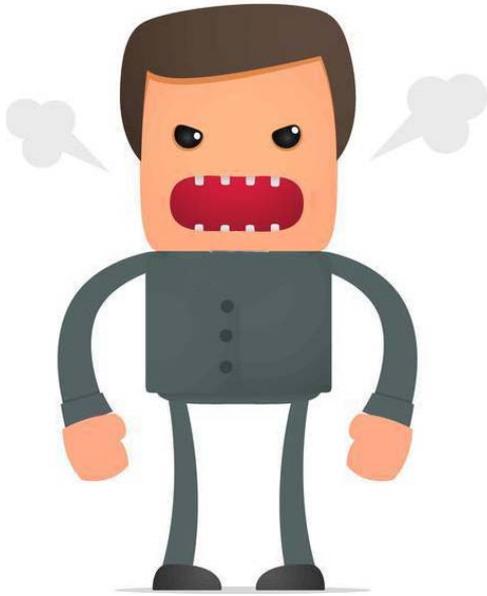


VERY POOR

Arrogantly Angry

Communication to Public

Pollution MOOD ↔ How Fearful



VERY UNHEALTHY

Violent - Dragon

Vision

*Translate Science to public
for Decision Support System
Bridging the Gap*

Human Resource Development –Spreading Message to Masses

M69



Feedback on SAFAR from Youngest Swimmer of India in CWG-2010

M62

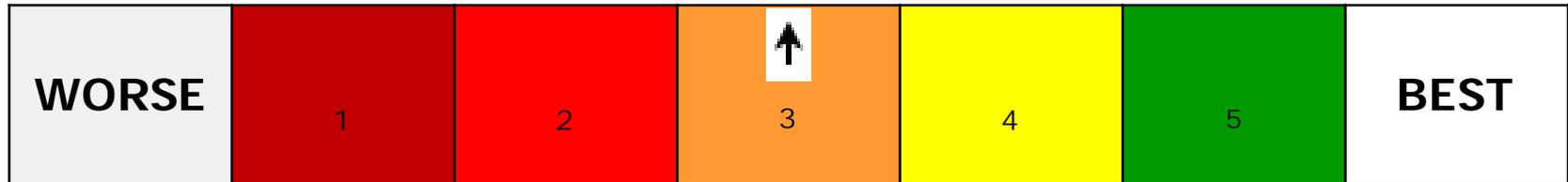


FINALLY

Public Advisory

How are you and your health will be – TOMORROW (15:00h)

STAGE = 3



< 1 = WORSE

The environment degraded to the point where rehabilitation is impossible

> 5 = BEST

The environment is clean and in perfect condition. No any anthropogenic influences

For Air Quality Online

Visit:

<http://safar.tropmet.res.in/>

Ask:

beig@tropmet.res.in

AHMEDABAD



Ahmedabad , Gujrat

Area : 8707 Km²
Density 2001 : 718
Density 1991 : 567
House Hold : 9643989
Population 2011 : 6775313





Bangaluru ,Karnataka

Area : 2190 Km²

Density 2001 : 2979

Density 1991 : 2210

House Hold : 10232133

Population 2011 : 7350039



