

→ Modeled annual average PM<sub>2.5</sub> concentration (2018) µg/m<sup>3</sup>

For urban Panjim, average PM<sub>2.5</sub> concentration was 28.3 ± 10.7 µg/m<sup>3</sup>. This is within the national standard (40) but nearly three times the WHO guideline (10).

→ Air monitoring infrastructure

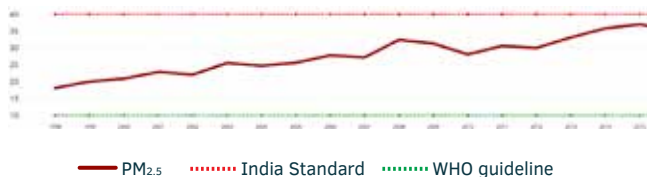


MANUAL STATIONS    CONTINUOUS STATIONS    REQUIRED STATIONS

→ Annual averages from the national ambient monitoring program (2011–2015) µg/m<sup>3</sup>

PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>
62.4 ± 38.2	5.2 ± 4.0	13.4 ± 7.6

→ Trend in PM<sub>2.5</sub> concentrations, based on satellite observations and global model simulations (1998–2016) µg/m<sup>3</sup>



Designing an effective Air Quality Management (AQM) plan for a city requires robust data on levels of pollution, affected areas, source contributors, peaking trends and possible control mechanisms.

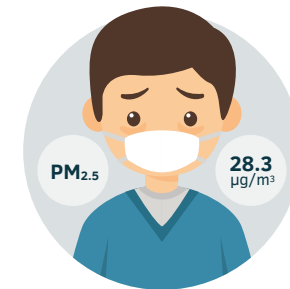
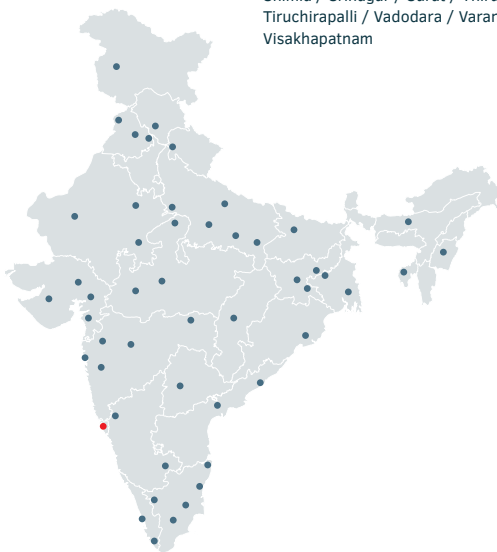
The Air Pollution Knowledge Assessment (APnA) City Program seeks to make this database available and also serve as a starting point for understanding air pollution.

The program, implemented by Urban Emissions and facilitated by Shakti Sustainable Energy Foundation, seeks to create a comprehensive, city-specific information pool by pulling together data from disparate sources, surveys, mapping and atmospheric modeling.

Policy options based on this information, and their implementation, would be the effective next steps in improving the air quality of our cities.

THE AIR POLLUTION KNOWLEDGE ASSESSMENT (APnA) CITY PROGRAM

- Agartala / Agra / Ahmedabad / Allahabad / Amritsar / Asansol / Aurangabad / Bengaluru / Bhopal / Bhubaneswar / Chandigarh / Chennai / Coimbatore / Dehradun / Dhanbad / Dharwad-Hubli / Gaya / Guwahati-Dispur / Gwalior / Hyderabad / Imphal / Indore / Jaipur / Jamshedpur / Jodhpur / Kanpur / Kochi / Kolkata / Kota / Lucknow / Ludhiana / Madurai / Mumbai / Muzaffarpur / Nagpur / Nashik / Panjim / Patna / Puducherry / Pune / Raipur / Rajkot / Ranchi / Shimla / Srinagar / Surat / Thiruvananthapuram / Tiruchirapalli / Vadodara / Varanasi / Vijayawada / Visakhapatnam

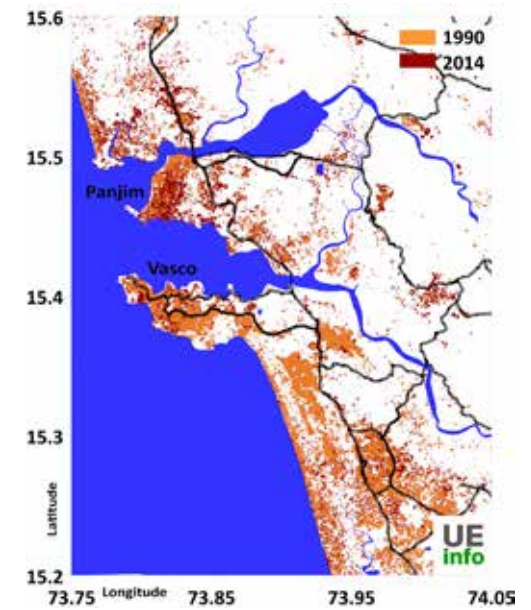
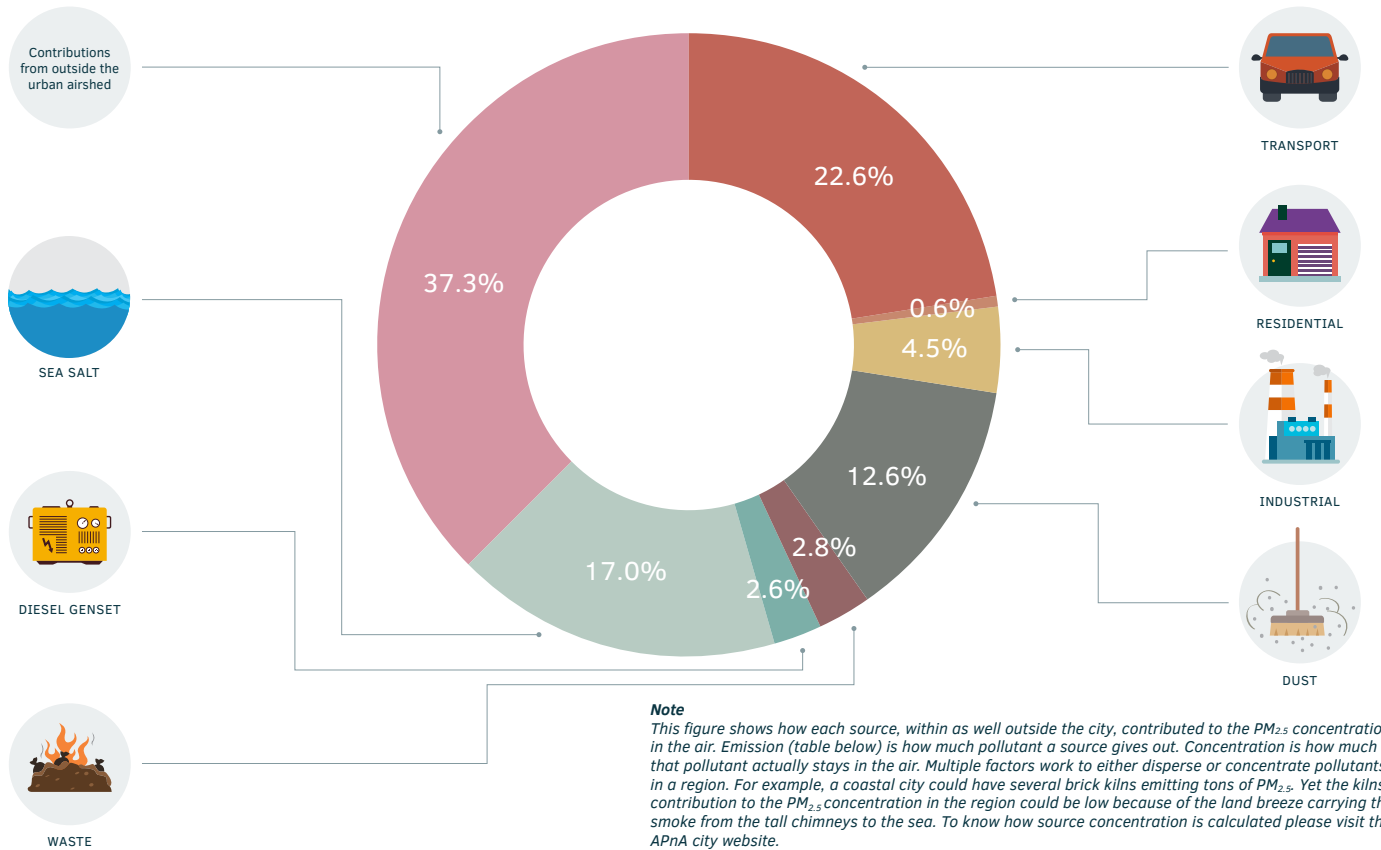


PANJIM

The city's PM<sub>2.5</sub> concentration is nearly three times the WHO standards. Transport and seasalt are the primary contributors.

For detailed information on Panjim Air Quality, visit [www.urbanemissions.info/india-apna](http://www.urbanemissions.info/india-apna)

## PM<sub>2.5</sub> concentration : source-wise percentage share in 2018



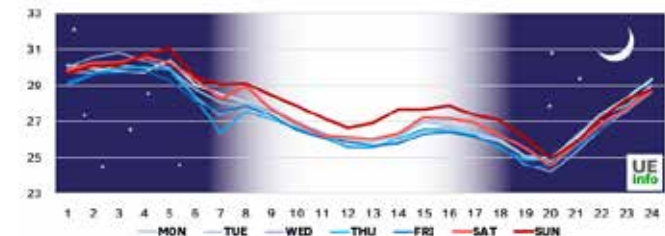
### → Global Human Settlements (GHS) built-up area

Urban areas in India are growing at a rapid rate. Using satellite observations derived Global Human Settlements (GHS) database, we can map the spatial footprint of a city over time. The map above shows the increase in built-up area between 1990 and 2014. An increase in built-up area usually means greater construction activity, intra-city transport, waste generation, and overall energy demand.

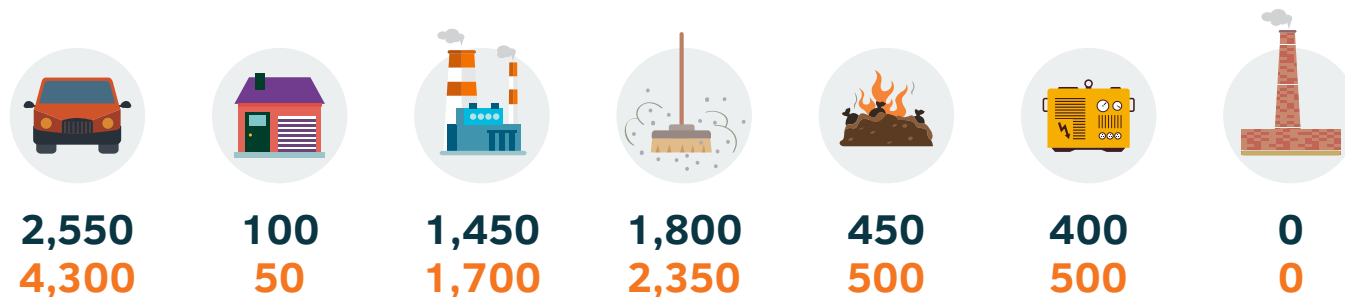
Urban land-use planning and provision of public transportation services is essential to address air pollution for cities in the future.

The graph below charts average speed of traffic by hour for everyday of the week within the city. As expected, speeds are greater at night and on Sundays and slows at peak times during the week. This is a summary of data extracted using Google Maps API services.

### → Hourly urban traffic speeds



## PM<sub>2.5</sub> emissions : source-wise share in tons in 2018 and 2030 (projected)



Total emissions in 2018 = 6,750 tons    Total emissions in 2030 = 9,400 tons