

Introduction

Ambient air in a city consists of various pollutants from varying emission sources. Emission inventory accounts the sources and amount of pollutants discharged into the atmosphere. Geographical information system(GIS) provides user interface and integrates different data types to present results in an appropriate manner for decision making. The high resolution gridded emission inventory are capable of providing detailed information about hot spots, relative contributions of various sources and sector that can be targeted for mitigation. This also facilitates important input to AQ-Forecasting models

Objectives

- To develop emission inventory of PM₁₀ and PM_{2.5} at a resolution of 1.0 km x 1.0 km over Ahmedabad Metropolitan Region.
- To understand relative contribution of different emission sources.

Campaign

Campaign was done to collect activity data of two types Primary and Secondary. Extensive field survey was done for several months in 2016 with participation of around 200 college students and more than 81217 samples were collected from various emission sectors.



Emission Sources

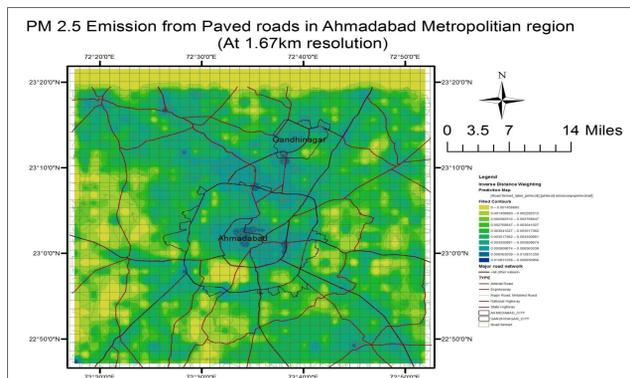
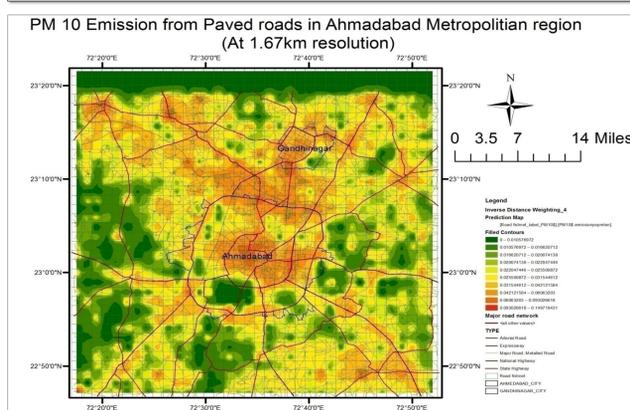
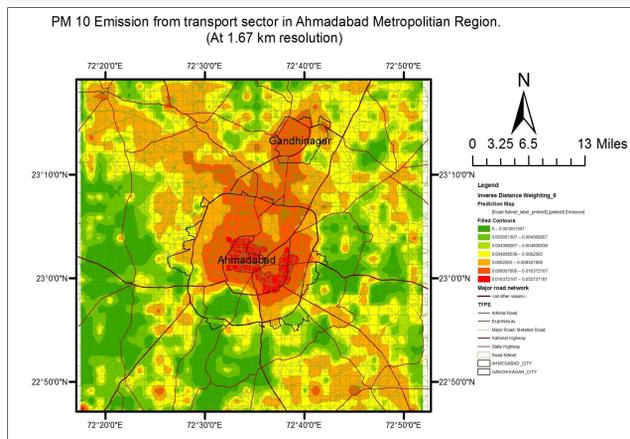
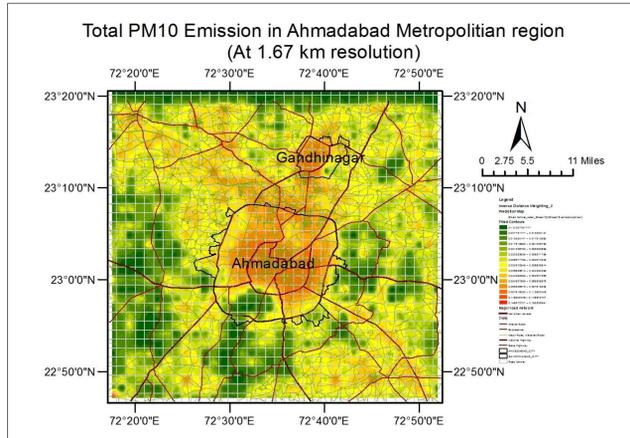
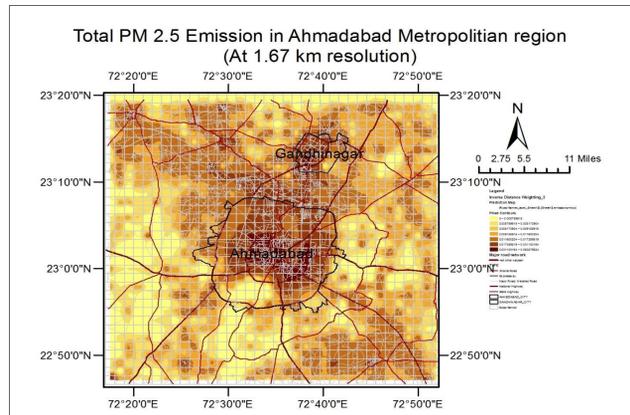
Emission sources – Emission sources are categorized into 5 different sectors:

- Industrial/Power sector- Based on fuel type used, fuel consumption, details of installed emission control device, operation days and production capacity.
- Transport sector- Based on source of vehicle and paved and unpaved roads. Depends on no. of vehicles, vehicle Km travelled.
- Residential sector- Based on cooking and heating in slum and other areas.
- Wind blown dust- Based on atmospheric wind blown dust.
- Open biomass burning- Based on solid waste burning, agricultural crop burning.

Emission values in percent(%) for Ahmedabad Metropolitan Region.

SECTOR	Pollutants(%)	
	PM ₁₀	PM _{2.5}
Transport	17	36
Industry and Power	21	33
Domestic	6	7
Wind blown dust	52	21
Open trash burning and brick Kilns	4	3

Results



GIS Modelling

➤ **Data collection-** Collection of attribute data which includes emissions, Population, zones(Transport, Domestic, wind blown dust from paved and unpaved road, Industry and power sector), Geo-referenced base maps.

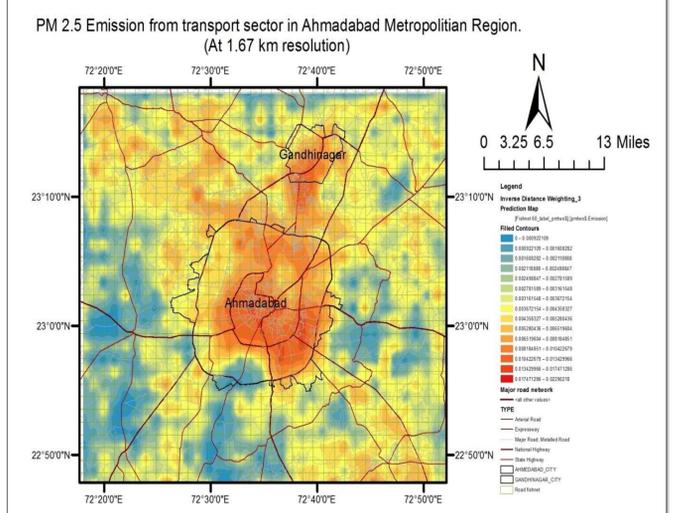
➤ **Digital data generation-** Base map digitization to extract 60 x 60 Km domain

➤ **Gridding of data-** A geo-referenced grid of 1.67 Km x 1.67 Km resolution was overlaid on the base map, with a total of 1295 cells, covering 3600 km of area.

➤ **Spatial distribution and Grid extraction-** Spatial allocation of emissions by overlaying emission data in each grid cell with each grid point in the cell.

➤ **Mapping-** Emission values from each sector have been mapped as point data attributes.

➤ **Interpolation modelling-** Interpolation has been used to convert the mapped point data into a continuous field, which is useful for visualization. Here the Inverse Distance Weighting(IDW) interpolation has been used.



Conclusions

• Contribution of PM₁₀ in Gg/Year by different sectors is 9.56 by Transport sector, 3.66 by domestic sector, 11.90 by Industry/Power, 29.00by Wind blown dust and 2.11 by Open trash burning and brisk kilns, and hence contributes to total of 56.24 Gg/Year.

• Contribution of PM_{2.5} in Gg/Yearby different sectors is 6.69by Transport sector,1.24 by domestic sector, 6.20by Industry/Power, 4.00by Wind blown dust and 0.53 by Open trash burning and brisk kilns, and hence contributes to total of 18.66 Gg/Year to ambient air in Ahmedabad Metropolitan Region.