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AIRSHED DELINEATION & MANAGEMENT

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Air quality of an area is a result of complex interrelations between various factors such as types & quantity of emissions, sources & intensity of activities, chemical & atmospheric transformations, enforcement and most importantly, local meteorology & geographical conditions, which often aggravates or conciliates the resultant.

India is a vast country with varied geographical features and climatic regions. The country's climate is strongly influenced by its diverse geographical features, encompassing Himalayan mountain range, Indo-gangetic plain, Thar desert, Western Ghats and Deccan plateau. The influence of meteorology and geography on air quality of an area becomes clearer when we analyse the air quality data of 131 cities generated from continuous ambient air quality monitoring stations. An in-depth analysis of Air Quality Index (AQI) of these cities for the period January – December 2020, reveals that the AQI for 31 cities never exceeded 'Moderately Polluted' category and 60 cities never recorded a single 'Very Poor' day, however, on the other hand 32 cities recorded at least one day in 'Severe' category. It is important to note here that all cities in 'Severe 'category are located in Indo-Gangetic Plain (IGP), except Singrauli and Bhiwadi, non-IGP land-locked industrial towns in Madhya Pradesh and Rajasthan. Among the cities with healthier AQI, none is located in IGP, 06 are coastal cities and 13 cities are under tropical wet & dry regions. While, geography and weather dictates dispersion capacity of an area, intensity of polluting activities within and outside a city is equally important, that is why Mumbai and Visakhapatnam frequently appear in 'Poor' AQI category despite pleasant coastal climate.

The need for regional delineation of airshed for air quality management in the country becomes more important in view of two facts, first, as observed in various studies significant percentage of air pollutants are contributed by atmospheric transport from sources located outside city boundaries and second, as evident by the substantial improvement in air quality during nationwide lockdown restrictions (March – April) during COVID19 pandemic, we need to move beyond city specific emission reduction targets and actions based on its administrative boundaries.

Commonly, an airshed is defined as a part of the atmosphere which behaves in a coherent way with regard to dispersion of pollutants. In other words, it is an area with a distinct air mass such that emissions emanating in the region remains within its boundaries. It can range from a small area with fewer polluting sources to large metropolitan agglomeration with complex air quality problems. While, it may seem similar to a watershed, an airshed is much more complex owing to lack of physical or visible dimensions and possibility of large area dispersion.

The methodology for delineating an airshed includes three main steps, first, quantification of emissions to prepare a multi pollutant emission inventory, second, collection of representative meteorological data & its analysis to evaluate variations at local & regional level and similarity of the data in the study region, and third, predicting air quality levels using air quality modelling tools, which will help in understanding atmospheric transport of pollutants from source to receptor and its dispersion in the study area. Normally, the preliminary analysis is carried out in a much larger area and is subsequently narrowed down based on results.

Various steps have been taken to address air pollution, mostly efforts are focused within administrative boundaries of a city or town. It is important to note here that, while Delhi NCR is demarcated based on administrative boundaries, the area of interest with regard to air quality management lies further beyond, towards North-West direction. As evident from wind rose diagrams of the region, prominently wind flows from North-West direction, making NCT of Delhi downwind to non-NCR districts of Hisar, Kaithal, Patiala, Fatehabad, Mansa and Hanumangarh, located at an aerial distance of 200 km from Delhi.

The regional airshed management has already been done in Los Angeles, Canada British Columbia and Mexico City, and lessons can be taken from their experience.

Development of regional airshed requires time, resources and efforts at multiple levels. The need for unified regional strategy is important due to two main reasons, first, to tackle complex air pollution issues which arise due to close proximity of polluted cities (e.g. cities in Indo-gangetic plain, major urban/industrial centres & satellite towns) which offset each other's positive efforts & outcomes, and second, to drive cooperation and collaboration among urban local bodies, implementing agencies, public enthusiasm and ensure optimal utilization of resources.

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