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AIR QUALITY ANALYSIS

INTRODUCTION :—

In addition to land and water, air is the prime resource for sustenance of life. With the technological advancements, a vast amount of data on ambient air quality is generated and used to establish the quality of air in different ways & areas.

As for the general public, they usually will not be satisfied with raw data, time series plots, statistical analyses, and other complex findings pertaining to air quality.

The Concept of Air Quality Index (AQI) has been developed and used effectively in many developed countries for over last 3 decades.

An AQI is defined as an overall scheme that transforms weighted values of individual air pollution related parameters (SO_2, CO, visibility, etc.) into a single number or set of numbers.

Applications of AQI :—

- Objectives that are served by AQI :—

  1. Resource Allocation :- To assist administrators in allocating funds & determining priorities.

  2. Ranking of Locations : To assist in comparing air quality conditions at different locations / cities.

③ Enforcement of standards :- To determine extent to which the legislative standards & existing criteria are being allowed.

④ Trend analysis : To determine change in air quality

⑤ Public Information : To inform the public about environmental conditions.

1438
338
150
188

⑥ Scientific Research : As a means for reducing a large set of data to a comprehendible form that gives better insight to the researcher.

● Development, Implementation & Dissemination of AQI :—

Air quality standards are the basic foundation that provides a legal frame work for air pollution control. An air quality standard is a description of a level of air quality that is adopted by a regulatory authority as enforceable. The basis of development of standards is to provide a rational for protecting public health from adverse effects of air pollution. to eliminate or reduce exposure to hazardous air pollutants, & to guide national / local authorities for pollution control systems.

● Air Quality Monitoring & AQI Considerations :—

The AQM network in India can be classified as — ① online, & ② manual.

① Online Monitoring network : These are automated air quality monitoring stations which record continuous hourly, monthly or annually averaged data.

In India, ~40 automatic monitoring stations are operated [e.g. continuous stations in Delhi].

② Manual :- The manual stations mostly involve intermittent air quality data collection, thus such stations are not suitable for AQI calculation particularly for its quick dissemination. In India, air quality is being monitored manually at 573 locations under National Air Monitoring Programme (NAMP).

- Air Quality Data Assessment & Analysis :—

Individuals who breathe polluted air experience health effects within a few hours or days. The district measures pollutant concentrations in the local ambient (outdoor) air & uses historical data to predict pollutant levels in the future.

- Air Quality Trends :— The District determines the effectiveness of air quality regulations using the results of monitoring data over time.

- **Air Quality Forecasts :—**

The District is attaining the national ambient air quality standards for all pollutants except ground-level ozone. Ground-level ozone, also known as smog, is created by a chemical reaction between precursor pollutants, primarily oxides of nitrogen (NO_x) & volatile organic compounds (VOCs) in the presence of sunlight & high temperatures.

- **Fenstock Air Quality Index (AQI) :—**

Fenstock (1969) proposed an index to assess the relative severity of air pollution and applied it to assess AQI of 29 US cities. This was the first index to estimate the air pollutant concentrations from the data on source emissions & meteorological conditions in each city :

$$AQI = W_i I_i$$

where, W_i = weightages for CO, TSP and SO_2

I_i = estimated sub-indices for CO, TSP & SO_2

- **Current Status of AQI application in India :—**

There have not been significant efforts to develop & use AQI in India, primarily due to the fact that the National Air Quality Monitoring Programme has

started only in 1984. Although many technical papers proposing specific indices appeared in international literature, no detailed study was undertaken to use an index in India.

Executive Summary :—

Awareness of daily levels of air pollution is important to the citizens, especially for those who suffer from illness caused by exposure to air pollution.

Further, success of a nation to improve air quality depends on the support of its citizens who are well-informed about local & national air pollution problems & about the progress of mitigation efforts.

Thus a simple yet effective communication of air quality is important. The concept of an AQI that transforms weighted values of individual air pollution related parameters.

A scientific basis in terms of attainment of air quality standards and dose-response relationships of various pollutant parameters have been derived & used in arriving at breakpoint concentrations for each AQI category.