Letters to the Editor

551·510·42 : 551·582 (547)

A NOTE ON URBANIZATION OF POONA

1. Urbanization generally introduces large quantities of foreign substances into the air. Air pollution can change the thermal properties of the atmosphere and affect many climatic elements like radiation, cloudiness, fog, visibility and atmospheric electric field. The optical clarity of the atmosphere commonly known as 'turbidity' is found to be reduced due to pollution.

Realising the malevolent effects of urbanization it is proposed in the present note to study its impact on the city of Poona.

2. Data on turbidity have been obtained from the climatological records of Poona. Information on growth of industries and population are made available by the Inspector of Factories and Municipal Corporation of Poona respectively.

3. The year-to-year fluctuations of the meteorological elements varied irregularly and precluded easy assessment of the trend of the elements with march of time. Therefore, in the present study the moving average technique of trend determination (Kendall and Stuart 1966) is employed.

A plot of the meteorological parameters against years in the present study indicated a parabola and hence it is decided to fit a second degree equation. The constants in the second degree polynomial were evaluated by the method of least squares. These constants were employed in evaluating the central value of the selected five terms. Subsequently, the first term is dropped and the sixth term included and the central value is again determined, thus moving on one term only. This operation continued till the last term is included in fitting the polynomial. The curve joining all these weighted values indicates the trend of the parameter.

4. *Growth of Population and Industry* — The population in Poona from 1950 to date shown in Fig. 1 indicates that the rate of growth of population prior to 1961 is much higher than the later period. The sudden fall in the population in 1961-1962 is presumably due to evacuation from the city consequent to the havoc caused by the floods resulting in destruction of some shelters. To have a general picture of the urbanization of the city the growth of industries polluting atmosphere is shown in Fig. 2 which indicates the increase in the number of industries only over those already existing. Although it is realised that domestic fuels and automobiles contribute to air pollution, in the present study the industries of sufficiently large size capable of polluting the atmosphere only are considered.

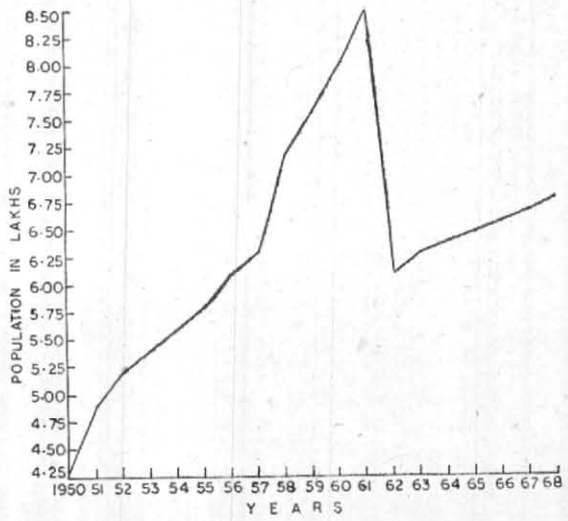

Fig. 1. Population of Poona during 1950–1968

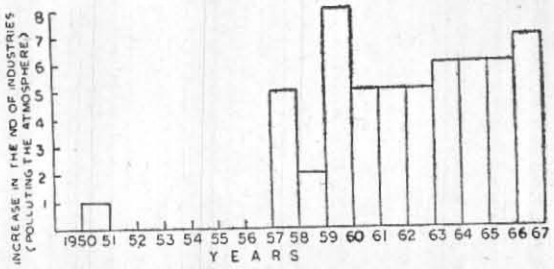

Fig. 2. Growth of industries in Poona

Turbidity — The industrialization of a city causes atmospheric pollution which effects the transmissivity of the atmosphere. Therefore, turbidity of the atmosphere over a city can be

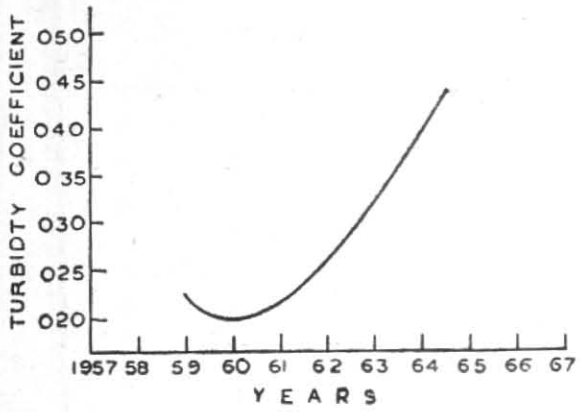

Fig. 3. Turbidity at Poona

taken as an index of the atmospheric pollutants/ aerosols (Mc Cormick and Baulch 1962).

Among the phenomena which cause variation in solar radiation, turbidity which is due to aerosols in the atmosphere is very important. It is well-known that solar radiation while passing through the earth's atmosphere undergoes (1) scattering by molecules of air and particles much smaller than the wave length of light (Rayliegh scattering) ; (2) scattering and absorption by cloud masses ; (3) selective absorption by atmospheric gases particularly oxygen , ozone, carbon dioxide and water vapour and (4) scattering and diffuse reflection from particles, *e. g.*, dust and smoke of size comparable with or larger than the wavelength of light. The amount of loss due to the last phenomena is highly variable with time and place.

The turbidity over Poona (Fig. 3) although showing a decreasing tendency in the initial stages is definitely showing an increasing trend and continues to be so later indicating increase in the aerosol content in the atmosphere probably due to industrialisation of the city.

5. The author is highly indebted to Shri M. Gangopadhyaya, Director, Agricultural Meteorology for helpful suggestions.

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