

Spatial and Temporal Patterns of the Air-Pollution Concentration of the City of Colombo and Impacts of the Socio-Economic Factors**Lasantha Manawadu**

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Abstract

The city of Colombo has been identified as a primate city by the urban Geographers based on the magnitude of the concentration of the population in the city, compare to the city system of the country. The city of Colombo (CMC) covers a total area of 37.3 sq Kilometers, which is about 5.7 percent of the land area of Colombo district. The population of Colombo has expanded rapidly from 155(000) in 1901 to 642(000) in 2001 and indicated the most populated city in the island with 17,200 persons per sq. Kilometer in 2001. Colombo is the capital city and commercial center of the country. High population concentration, large number of daily commuters, city oriented traffic flows and traffic conjunction, large number of slum and shanty population are very significant characteristics for the air quality of the city. The average number of vehicles entered to the city in a weekday is about 5000. Colombo is a rapidly developing city in South Asia. As industrialization, power generation, urbanization and transportation are the major developmental areas of Colombo City. But unfortunately these developmental were taken place with lack of holistic environmental management approach.

The main objective of this study is identifying the spatial and temporal patterns of the air pollution and the contribution of the socio-economic factors for its spatial patterns. The specific objectives of this study are:

- Considering So₂ (Sulfur Dioxide) and No₂ (Nitrogen Dioxide) as reflectors of the air quality, their spatial pattern has been identified using interpolation techniques available in Geographical Information Systems.
- The seasonal variation of SO₂ and NO₂ were analysed to examine the Monsoon and Sea Breeze effectiveness for changing spatial pattern of air quality.
- Analyze the effectiveness of the socio-economic factors for spatial patterns of the air quality.

This study was carried out using secondary data available in different government agencies. The air quality data has been collected by the National Building Research Organization (NBRO) was the main data source for SO₂ and NO₂. A significant number of air quality observation points (14) have been located by the NBRO through out the city of Colombo and collected SO₂ and NO₂ daily for the last 12 months. To study the spatial pattern of the SO₂ and NO₂, Inverse Distance Weighted (IDW) Spatial Interpolation techniques were adopted.

The socio-economic data were classified into two categories according to their effectiveness for the air quality, namely positive factors and negative factors. The positive sources are generating pollutants (population density, housing density, traffic flow, building density, underserved housing density, road density, retail employment density, urban land use) and negative (water bodies, parks and playgrounds, vacant land) sources are sinking pollutants. In the sense of data formats, some attributes were related polygons, some were related to lines and some were related to points.

To avoid the complications from different feature types in the analysis process, all data were transformed (Spatial and Attributes) into 1 km grid using techniques available in GIS. The cells represented spatial data and each cell has contained several attributes, which classified broadly into positive and negative factors. Finally statistical analyses have been done based on the cell (grid) values to study the relationships between air qualities and attributes.