AIR POLLUTION TRENDS IN THE LARGEST INDUSTRIAL AREA IN SRI LANKA

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Abstract.

Urbanization and industrialization are the main causes of air pollution. However, in Sri Lanka, most activities on air quality monitoring and management are concentrated in Colombo, which is the commercial capital of Sri Lanka. Few attempts were taken to study air pollution activities in industrial areas. Therefore, this attempt has been made to discuss the air quality levels at Sapugaskanda, a residential area that developed later in to an industrial area. The only petroleum refinery in Sri Lanka is situated at Sapugaskanda. In addition, three thermal power plants of capacities 150, 60 and 40 MW that use furnace oil, and several industries are situated within the area. Therefore, this is presently considered as the biggest industrial area in Sri Lanka.

Spatial variation of air quality levels in Sapugaskanda area shows that there is more pollution in the North – East direction than other direction. Heiyantuduwa area is found to be the most polluted area in comparison. Temporal variations of air quality at two locations Manelwatta and Gonawela from 1997 to 2004 reveals that the air pollution levels in both locations are on the increase. This increasing trend of air pollution may be common to other areas as well. However, data in other areas are insufficient to arrive at a conclusion. When compared with Colombo, Sapuagaskanda is less polluted with respect to air pollution.

INTRODUCTION

Urbanization and industrialization are the main causes of air pollution, a problem that has been affecting most of countries in the world for a long period of time. In Sri Lanka also, the rapid growth of cities together with associated industries, transport system etc. the air pollution is on an increasing trend, especially in the main cities and in industrial areas. However, most activities on air quality monitoring and management are concentrated in Colombo, which is the commercial capital of Sri Lanka. Few attempts were taken to study air pollution activities in other areas. Is also noted that almost no attempt has been made to study air quality in industrial areas except for sporadic monitoring work. Sapugaskanda, is a residential area that developed later in to an industrial area where the petroleum refinery and several industries are situated within. Therefore, this area presently is considered the biggest industrial area in Sri Lanka.

Sapugaskanda is a suburban area situated on a flat terrain with isolated hills, approximately about 30 km away from the commercial capital of Colombo in the direction of North East. Sapugaskanda is in the Biyagama division in which the total land area of is about 6190 ha. The population density is about 23.7 persons/ha and the average annual growth rate is 0.48.

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The industrial estate (called Lindel) has been in 51 ha. In general, poor housing and high population density areas surround the study area. At present, 17 industries are operating in said industrial park. Out of which two are thermal power plants (51 MW Asia Power and 24 MW Lakdanavi), and they are considered to be two major point sources of air pollution within the

premises of Lindel. However, the 160 MW CEB Power Station & the petroleum refinery located outside the Lindel, contribute to the total air pollution load. In addition, several other industries, such as metal & re-melting, metal crushing etc. have come up in the area. Transport network in the study area mainly consist of Colombo-Biyagama road, Kiribathgoda-Biyagama road, Kiribathgoda-Pettah road and other small by roads.

Air pollution emissions from these sources will disperse according to wind pattern of the area. In this paper, the trend and the spatial distribution of air pollution in Sapugaskanda area is discuss.

METHODOLOGY

Ambient air quality monitoring with respect to SO_2 and NO_2 at two locations were carried out from 1997 to 2004 in Sapugaskanda area to cover each climatic monsoon. "Automated" Air Quality Monitoring techniques were used up to 2001 and afterwards Passive Air Quality Monitoring techniques were used.

The parameters of SO_2 and NO_2 were monitored at twenty (20) locations within the study area using Passive Air Quality Monitoring techniques. Monitoring locations are given in the figure 01. Monitoring was carried out on weekly basis and sampling height was about 3m from the ground level.

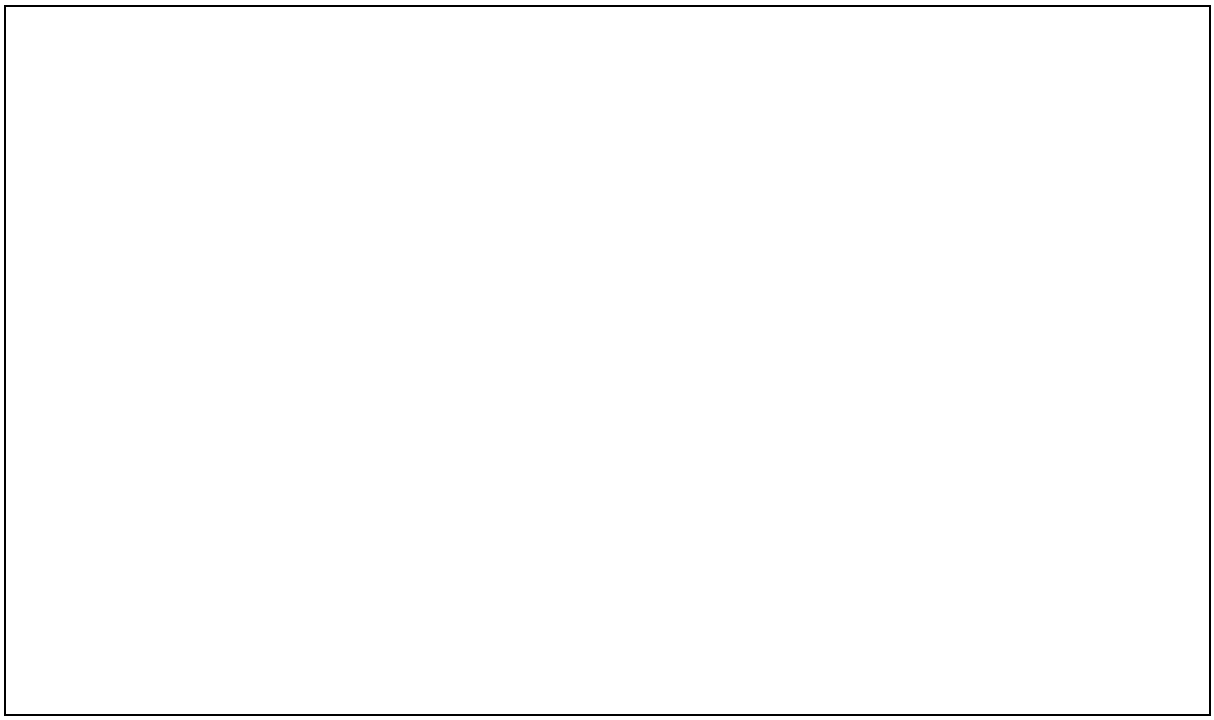

Figure 01: Monitoring locations at Sapugaskanda area

RESULTS AND DISCUSSION

The air quality trend with respect to NO_2 and SO_2 at two locations, Gonawala and Manelwatte from 1997 - 2004 is shown in Fig. 02 & 03, and they indicate that the pollution levels are on an increasing trend.

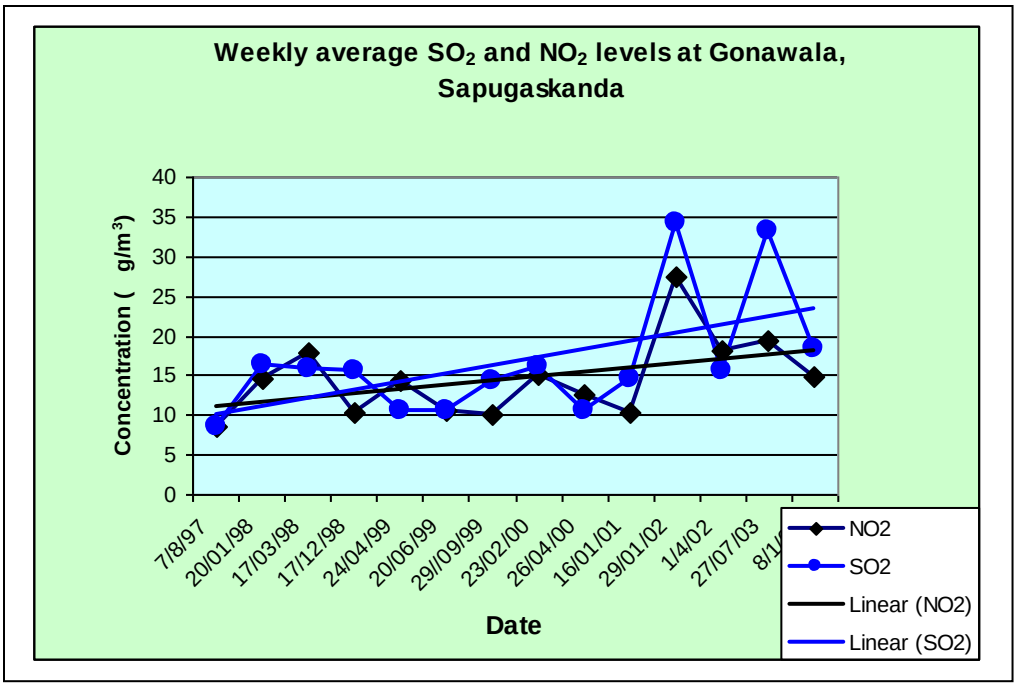

Figure 02. Weekly average levels of SO_2 & NO_2 at Gonawala, Sapugaskanda.

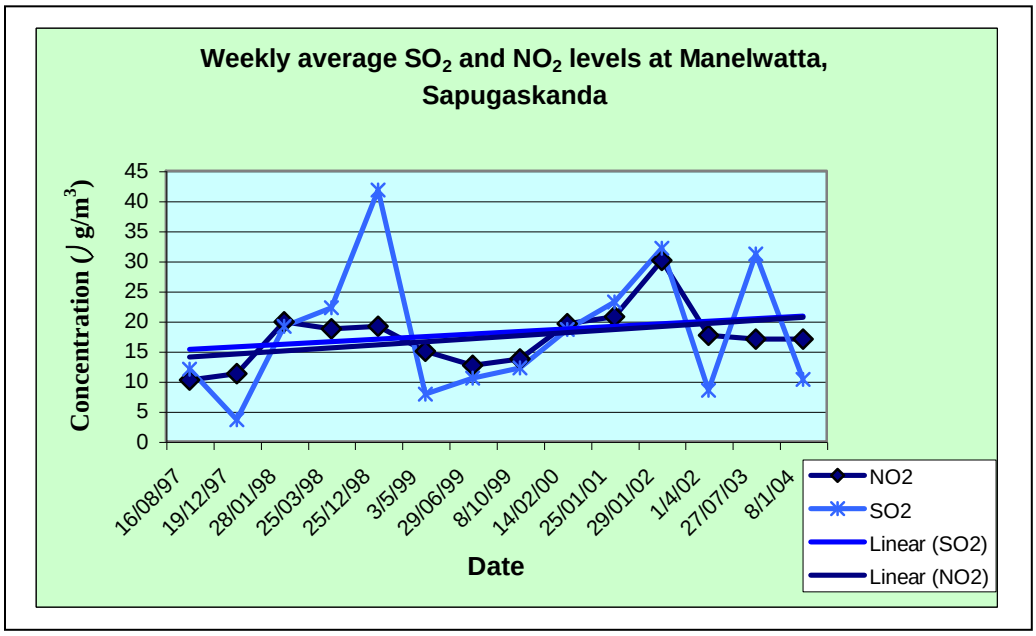

Fig 03. Weekly average levels of SO_2 & NO_2 at Manelwatta, Sapugaskanda.

Spatial variation of SO_2 and NO_2 levels in Sapugaskanda area are given in Fig. 04 and 05 respectively. It reveals that the SO_2 levels were found to be scattered in all directions during the South-West monsoon, and the levels were fractionally high in South-West locations to pollution sources during the North–East monsoon. The NO_2 levels at North-East direction from pollution sources were marginally high during South-West monsoon and scattered during North-East monsoon. In General, SO_2 and NO_2 levels are scattered in the area throughout the year.

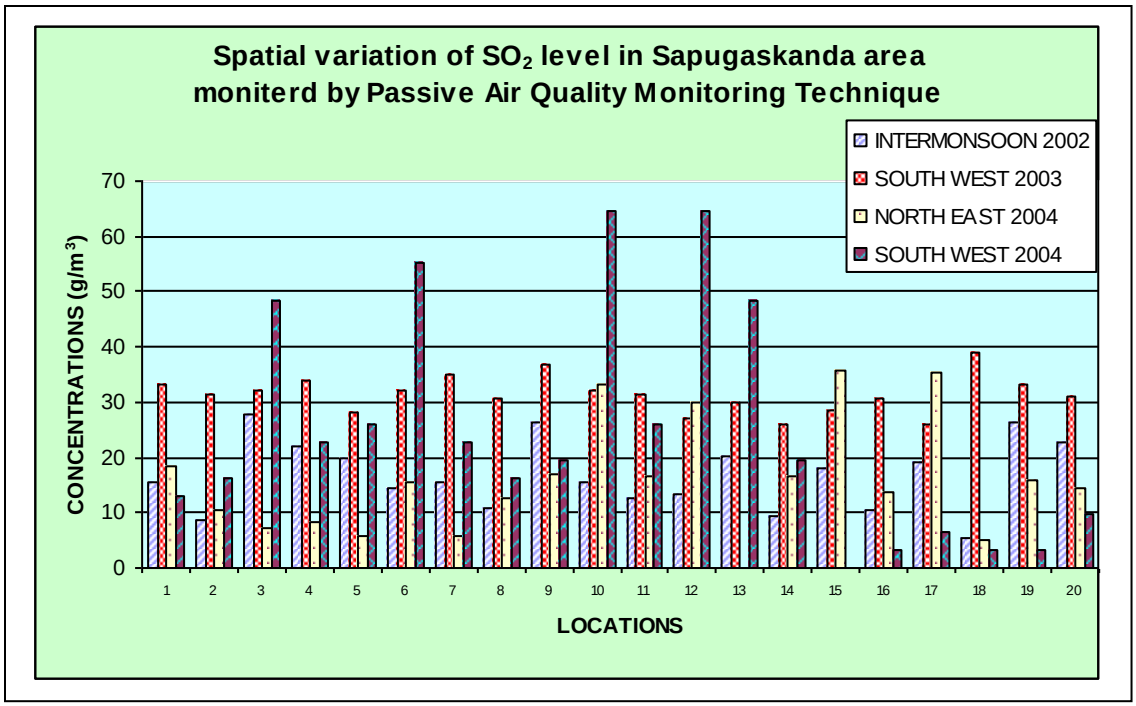

Fig.04 Spatial Variation of SO_2 in Sapugaskanda

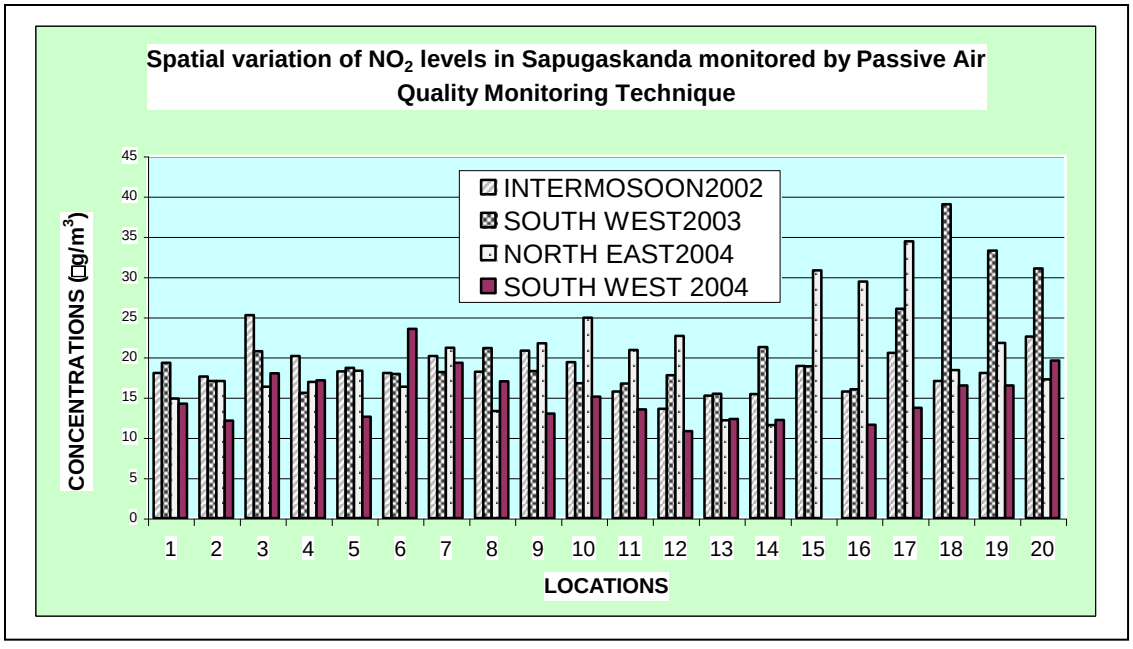

Fig.05 Spatial Variation of NO_2 in Sapugaskanda

The SO_2 and NO_2 levels in most of other locations in the area were found to be higher than that of Gonawala (L1) and Manelwatta (L2). Therefore, if the same trend of air pollution at Gonawala and Manelwatta is assumed in other areas, the situation will be critical mainly at North-East direction. However, if we compare the highest recorded NO_2 value at Sapugaskenda area with Colombo level during the same period, Colombo is more polluted than Sapugaskanda as shown in Fig.06.

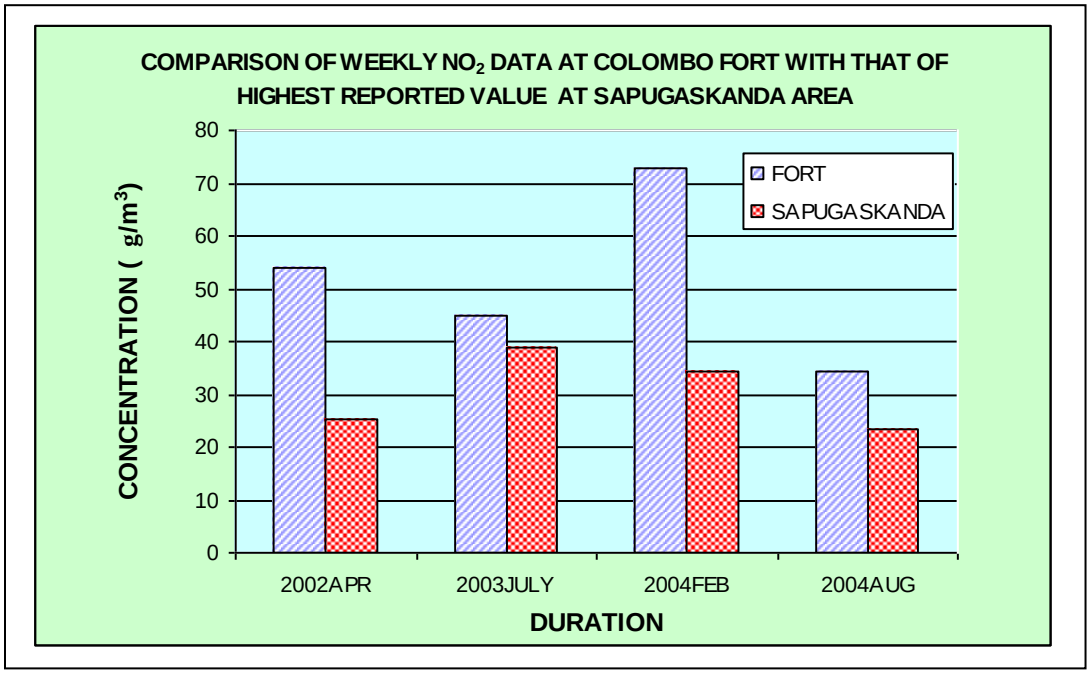

Fig.06 Comparison of highest recorded NO_2 levels at Sapugaskanda area with NO_2 levels at Colombo Fort.

CONCLUSION

- Air pollution levels were found to be scattered throughout the year in Sapugaskanda area and it is on an increasing trend.
- Colombo Fort is more polluted when compared to the highest pollution location in Sapugaskanda area

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