

# Current Scenario of Air Quality in and Around the Vicinity of Maruthamalai Hill Shrine, Coimbatore

M.Thamaraikannan<sup>1,2</sup> Dr M. Balakrishnan<sup>2</sup> Dr.S. Sureshkumar<sup>1\*</sup>

<sup>1,1\*</sup>Department of Animal Resource and Science, Dankook University Cheonan-si, Chungnam 31116, Korea

<sup>2</sup>Department of Environmental Science, PSG College of Arts and Science, Coimbatore

**Abstract:-** Air is one the major source for all living organisms to sustain on the earth. Nowadays due to heavy traffic and industrial population most of the cities are affected by air pollution. In this research the Marudhamalai Hill Shrine was selected as the study area to monitor the air quality in its vicinity. Marudhamalai is located on the Western Ghats in Coimbatore district. It is famous for the Murugan temple located on it as people from Coimbatore and other parts of India visit every year. From the results it was clear that the forest surrounding the hill shrine not have medicinal plants but these plants help in to maintain the air quality parameters resulting in the quality to be within the prescribed limits.

**Keywords:-** Air Quality Monitoring, PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>2</sub>, Marudhamalai

## I. INTRODUCTION

Air is one of the fundamental endurance components of the human life. Air includes blend of gases which is utilized in breathing and a great deal of different exercises. The blend contains a gathering of gases of about steady fixations and a gathering with focuses that are variable in both reality. By volume, dry air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% Carbon di-oxide, and modest quantities of different gases. Air likewise contains a variable measure of water fume, on normal around 1%. Air has a basic impact in human's life, that one can't live without it in any event, for a couple of moments. It is important to protect the air breathable.

Air contamination might be depicted as pollution of the climate by vaporous, fluid, or solid wastes or by items that can jeopardize human well being and government assistance of plants and creatures, assault materials, decrease perceivability or produce unwanted scents. Albeit a few poisons are discharged by normal sources like

volcanoes, coniferous forest, and underground aquifers, the impact of this contamination is little when contrasted with that brought about by emanations from modern sources, force and warmth age, squander removal, and the activity of inner burning motors. Fuel ignition is the biggest supporter of air contamination discharges, brought about by man, with fixed and versatile sources similarly capable. The air contamination issue is experienced open air just as indoor.

## II. MATERIALS AND METHODS

### ➤ Study Area

Maruthamalai hills, part of the Southern Western Ghats in Coimbatore district of Tamil Nadu lies between 76° 55' E and 11° 0' and 11° 5' N. The forest type of this region is classified as dry deciduous. Annual rainfall is around 450 mm and temperature varying between 17°C and 38°C. The altitudinal range between 450 to 975 m above MSL. The soil is generally shallow with sandy loam texture and rocky substratum is available at slope areas (Paulsamy, 2011). Western Ghats older than Himalayas is one of the 34 Global Hot spots of Biodiversity flora, fauna, landscape and ethnicity (Sindhuja *et al.*, 2012).

### ➤ Sampling Locations

Ambient air survey was conducted at Marudhamalai Hills and its surrounding areas using Respirable Dust Sampler APM 460 BL. Locations and other details are given in Table 1 and Table 2

1.	Near Marudhamalai Temple (Up)
2.	Car Parking Marudhamalai Temple (Up)
3.	Marudhamalai Entrance (Down)
4.	Marudhamalai Mini Bus Stand (Down)

Table 1:- Air Monitoring Sampling Stations Located At Marudhamalai



Fig 1:- Location of Air Sampling Sites

#### ➤ Analysis

Particulate Matter (PM<sub>10</sub>), Sulphur dioxide(SO<sub>2</sub>) and oxides of Nitrogen (NO<sub>2</sub>) were measured using Respirable Dust Sampler, West and Gaeke method and Jacob Hochheiser method (Saravanakumar *et al.*, 2016) respectively.

### III. RESULTS AND DISCUSSION

#### ➤ Air Quality

According to Table 2 it was observed that the PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> concentrations obtained at the different locations are below the prescribed limit (Figure 2). The maximum and minimum PM<sub>10</sub> was found to be in Marudhamalai Mini Bus Stand (Down) and Near Marudhamalai Temple (Up) respectively. Due to the presence of vehicular emissions from mini bus functioning at the hill shrine, the PM<sub>10</sub> concentration showed maximum (48.4 µg/m<sup>3</sup>) than other four sites. According to Sharma and Gupta (2017) the 24 hour monthly average concentration of PM<sub>10</sub> around the Golden temple was found 142 µg/m<sup>3</sup>. The maximum value for the PM<sub>10</sub> concentration was 300 µg/m<sup>3</sup> and was observed for the month of October. It is because of the fact that in this month along with stubble burning the crackers pollution during Diwali festival contributes towards air pollution. This value is about thrice the National Ambient Air Quality Standards (NAAQS, 2009) prescribed by the Central Pollution Control Board.

Similarly the maximum SO<sub>2</sub> (15.6 µg/m<sup>3</sup>) and NO<sub>2</sub> (30.4 µg/m<sup>3</sup>) concentrations were also recorded at the Marudhamalai Mini Bus Stand (Down) and minimum SO<sub>2</sub> (8.2 µg/m<sup>3</sup>) and NO<sub>2</sub> (19.6 µg/m<sup>3</sup>) concentrations at Near Marudhamalai Temple (Up) and Car Parking Marudhamalai Temple (Up). Study carried out by Balashanmugam *et al.*, 2012, shows that the NO<sub>2</sub> levels have exceeded limits at all the eight sample sites and SO<sub>2</sub> at all the eight sites has not crossed the limits. NO<sub>2</sub> here is higher than the limit by 18%, and SO<sub>2</sub> is 57.2 percent of the limit. NO<sub>2</sub> level is the second largest at the railway level crossing. The only source for NO<sub>2</sub> is the auto emission, in the absence of any other industrial or commercial activities in the region.

Anyhow while comparing the earlier study (Eco friendly environmental management awareness program, 2006) suggests that the pollution levels increased two fold. Similar research was carried out at the Shiridi Sai Baba Temple in Maharashtra (Kankal and Gaikwad, 2011) were it can be seen that the concentration of SPM, SO<sub>2</sub> and NO<sub>2</sub> ranges from 39.93 µg/m<sup>3</sup> to 147.56 µg/m<sup>3</sup>, 19.25 µg/m<sup>3</sup> to 38.16 µg/m<sup>3</sup> and 6.68 µg/m<sup>3</sup> to 9.84 µg/m<sup>3</sup> respectively. It was observed that high SO<sub>2</sub> concentrations were generally associated with the wind blowing from WNW-NW directions, and the high SPM concentrations were usually related to the wind blowing from W-NW directions. The sampling was carried out for nearly nine months and SPM, SO<sub>2</sub>, NO<sub>2</sub> were analyzed for 8 hrs. The average concentration for SPM, SO<sub>2</sub>, and NO<sub>2</sub> was found to be 91.61 µg/m<sup>3</sup>, 27.18 µg/m<sup>3</sup>, 8.14 µg/m<sup>3</sup> respectively. According to CPCB recommendation the pollutants concentration should be within 200 µg/m<sup>3</sup> for SPM, 80 µg/m<sup>3</sup> for SO<sub>2</sub> and NO<sub>2</sub>.

Parameters	Unit	Locations				Standards As per CPCB
		1	2	3	4	
Particulate Matter Size Less then PM <sub>10</sub> µg	µg/m <sup>3</sup>	34.6	38.2	42.4	48.4	100
Sulphur Di Oxide as SO <sub>2</sub>	µg/m <sup>3</sup>	8.2	9.6	13.8	15.6	80
Nitrogen Di Oxide as NO <sub>2</sub>	µg/m <sup>3</sup>	20.4	19.6	28.6	30.4	80

Table 2:- Air Quality in Different Sampling Stations in and Around Marudhamalai

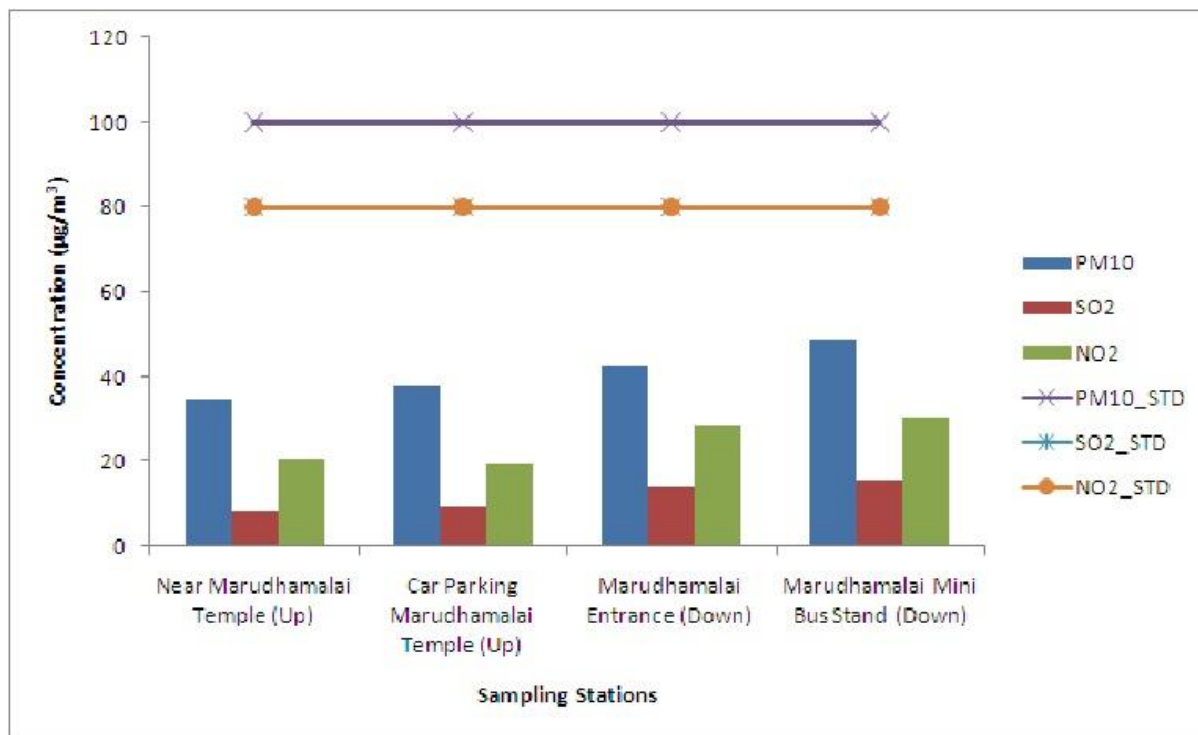


Fig 2:- Air Quality in and Around Marudhamalai

**IV. SUMMARY AND CONCLUSION**

The results obtained in the study showed higher concentrations of PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> in and around the Marudhamalai Hill shrine when compared with the older records. This increment may be due to the increase in vehicular population at the temple. All three air quality parameters reveal that the maximum concentrations were obtained at the mini bus stand area where frequent movement of vehicles through the area. But the surrounding nature maintains the concentration level below the permissible limit. Thus the study finally concludes that the air quality in and around the Marudhamalai hill shrine is perfectly below the prescribed standard limits.

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**REFERENCES**

- [1]. Balashanmugam P., Ramanathan A. R., And Nehru Kumar V. (2012). Assessment Of Ambient Air Quality in Chidambaram a South Indian Town. Journal of Engineering Science and Technology Vol. 7, No. 3 (2012) 292 - 302.
- [2]. Eco friendly environmental management awareness program - Marudhamalai temple - By Dept of Environmental Science, PSG College of Arts and Science, Coimbatore, 2006.
- [3]. Kankal S. B. and Gaikwad R. W. Studies on noise and air quality monitoring at Shirdi (Maharashtra), India. Pelagia Research Library Advances in Applied Science Research, 2011, 2 (1): 63-75.
- [4]. National Ambient Air Quality Standards (NAAQS), 2009. Available from <http://www.cpcb.nic.in/NationalAmbient-Air-Quality-Standards.php>. (Accessed 20.03.2018).
- [5]. Paulsamy S. (2011). Marudhamalai Hills of Western Ghats, Coimbatore District, Tamil Nadu – A potential ecosystem for medicinal plants. Journal of Research in Plant Sciences (2011) 01: 012 – 026.

- [6]. Saravanakumar R., Sivalingam S. and Elangovan S. (2016). Assessment of Air Quality Index of Coimbatore City in Tamil Nadu. *Indian Journal of Science and Technology*, Vol 9(41), DOI: 10.17485/ijst/2016/v9i41/99185, November 2016.
- [7]. Sindhuja R., Rajendran A. and Jayanthi P. (2012) Herbaceous life forms of Maruthamalai Hills, Southern Western Ghats, India. *Int. J. Med. Arom. Plants*, ISSN 2249 – 4340 Vol. 2, No. 4, pp. 625 – 631, December 2012.
- [8]. Veena Sharma and Gagan Gupta. (2017) The particulate matter concentration around the Golden Temple, Amritsar, Punjab. *International Conference on Recent Innovations in Science, Agriculture, Engineering and Management*, University College of Computer Applications, Guru Kashi University, Bathinda, Punjab. 20<sup>th</sup> November 2017.