

Use of Passive Air Sampling Technique to Monitor Air Quality Levels in Protected Areas: A Case Study in Horton Plains National Park

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Horton Plains National Park (HPNP) is an ecologically sensitive area; therefore, utilization of such an area should involve a high consideration on environmental safeguarding. Visitor statistics of HPNP clearly indicate that the number of visitors is in increasing trend and parallel increment of vehicles entering the park each year. But, the park does not have any regular air quality management system in place yet and the past measurements of air pollution have been done on an ad hoc basis. In this context, the necessity to carry out a study to determine current levels of Nitrogen Dioxide (NO₂) and Sulfur Dioxide (SO₂) concentrations in ambient air in the National Park and initiation of an ambient air quality database was identified. This research work describes the determination of levels of NO₂ and SO₂ at HPNP using of passive sampling technique. Ambient levels of these pollutants were monitored in twelve sites including two background sites from 9th November 2016 to 31st January 2017 at two weeks' intervals.

There was a significant strong positive relationship between the results obtained by duplicate sampling of passive sampling device. Highest variation of both NO₂ and SO₂ was observed in the Ohiya road ranging from 1.02 µg/m³ to 6.41 µg/m³ and 4.75 µg/m³ to 21.14 µg/m³ respectively. The highest two weeks mean concentrations of NO₂ and SO₂ were recorded at the Car park and Pattipola road with values of 3.67 ± 1.92 µg/m³ and 17.68 ± 4.58 µg/m³ respectively. The lowest two weeks mean concentrations of NO₂ and SO₂ were recorded in undisturbed forest site (background site) and forest die back site with values of 0.95 µg/m³ ± 0.38 and 2.91 ± 1.56 µg/m³ respectively. Ambient NO₂ concentrations of 6.41 µg/m³ and 0.32 µg/m³ were recorded as Highest and lowest levels for the entire data collection period respectively for Ohiya road and background site. Highest and lowest SO₂ levels of 25 µg/m³ and 1.32 µg/m³ were obtained for the Pattipola road site and the background site. Results indicate that the measured air pollutant levels in HPNP currently are very low and do not exceeded the Sri Lankan ambient air quality standards. Furthermore, correlations of ambient pollutant levels (NO₂, SO₂) with visitor presence, rainfall, temperature and relative humidity were also investigated in this study.

Keywords: Air Pollution, Horton Plains National Park, Nitrogen Dioxide, Passive Sampling, Sulphur Dioxide