

Blue Mountains and Lithgow Ambient Air Quality Monitoring

Winter Report 2019



Participating Organisations:

Blue Mountains City Council
Blue Mountains Conservation Society
Blue Mountains Union and Community
Doctors for the Environment
Environment Protection Authority
Lithgow Environment Group
Lithgow City Council
Nepean Blue Mountains Local Health District
Department of Planning, Industry and Environment
Western Sydney University

ACCRONYMS

AM	Arithmetic Mean
AQM	Air Quality Monitoring
BMCC	Blue Mountains City Council
BMCS	Blue Mountains Conservations Society
BMUC	Blue Mountains Union and Community
CI95	95% Confidence Interval
CO	Carbon monoxide
DPIE	Department of Planning, Industry and Environment
EPA	Environment Protection Authority
GM	Geometric Mean
KOALA	Knowing Our Local Ambient Air Quality
LCC	Lithgow City Council
NBMLHD	Nepean Blue Mountains Local Health District
NEPM	National Environment Protection Measure
PM	Particulate matter
PM_{2.5}	Particles with a mass median aerodynamic diameter of 2.5µm
PM₁₀	Particles with a mass median aerodynamic diameter of 10 µm
ppm	Parts per million
pphm	Part per hundred million
QUT	Queensland University of Technology
WSU	Western Sydney University

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1. BACKGROUND

The Blue Mountains and Lithgow Air Watch project is a 12 month community initiated research project supported by the NSW Environment Protection Authority (EPA) and the NSW Department of Planning, Industry and Environment (DPIE, formerly the Office of Environment and Heritage), as well as other local stakeholders.

The purpose of the project is to provide a better picture of air quality in the region and help inform future initiatives to protect air quality. This report presents the winter findings from, June to August 2019.

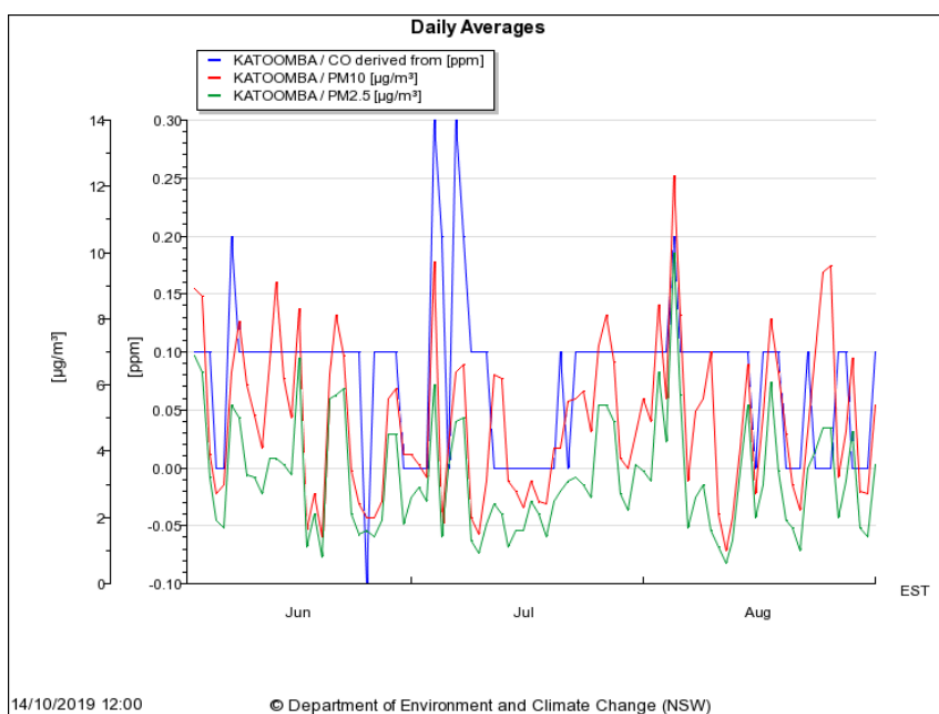
2. RESULTS & DISCUSSION

Katoomba Compliance Station Monitoring

Air quality data collected between the 1ST June and 31st of August 2019 at the Katoomba compliance station indicated that air quality indicators did not exceed the health based air quality standards for particulate matter PM₁₀1 of 50 µg/m³ (24-hour average), and particulate matter PM_{2.5}2 (24-hour average) and carbon monoxide (CO) 9 ppm (8-hour average) during the period (Figure 1). The readings for other air quality indicators including, nitrogen oxide, nitrogen dioxide, sulphur dioxide and ozone were all also considerably lower than air quality health guidelines. These results can be found in Appendix A.

Daily Averages

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Figure 1: Time Line of Daily PM_{2.5}, PM₁₀ and Carbon Monoxide Averages from Katoomba Compliance Station, Winter 2019

1 PM₁₀ = Particles with a mass median aerodynamic diameter of 10µm
 2 PM_{2.5} = Particles with a mass median aerodynamic diameter of 2.5µm

KOALA Low Cost Sensor Particulate Data

Low cost air quality sensors, known as KOALAs (Knowing Our Ambient Local Air-Quality) are located at Katoomba, Lithgow, Springwood and Wentworth Falls. Median particulate concentrations appear to be higher in Springwood in winter 2019 compared to the other locations of Katoomba, Lithgow and Wentworth Falls (Figure 2). The pre and post co-location data will need to be more closely examined at the end of the project to analyse the differences between townships, as well as to address for potential drift in sensors over time.

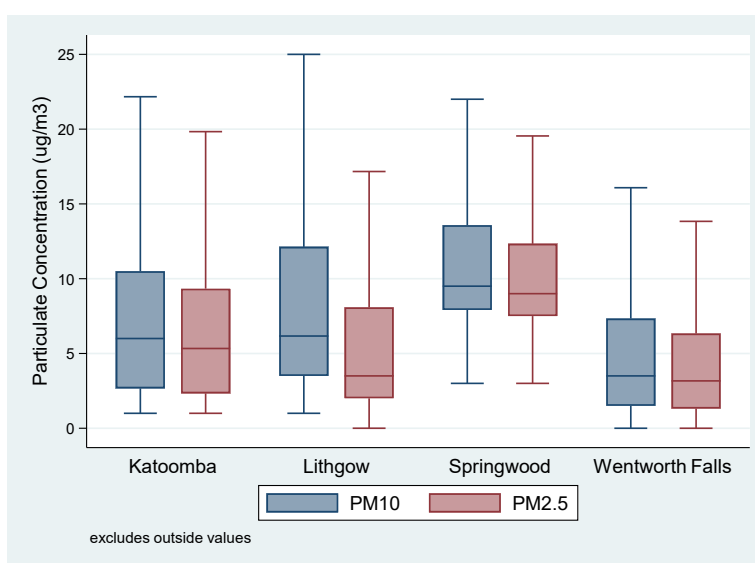


Figure 2: Comparison of Particulate Concentrations by Township, 1st June to 31st August 2019.

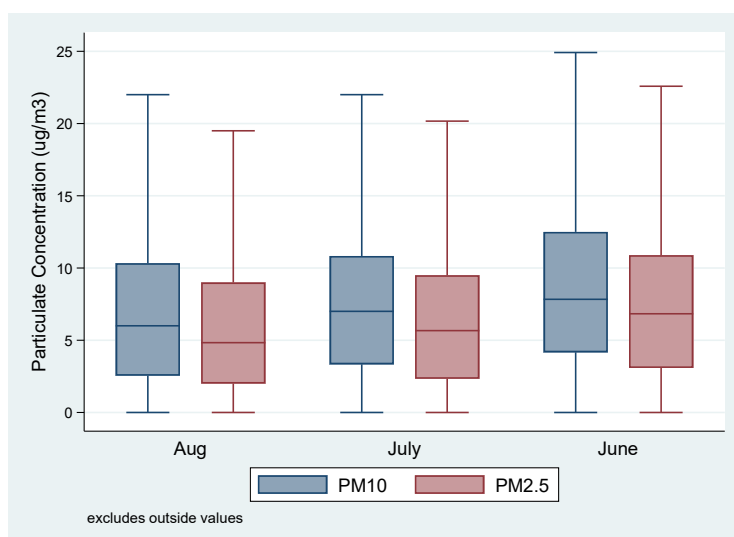


Figure 3: Comparison of Monthly Particulate Measurements for Blue Mountains, including Lithgow, 1st June to 31st August 2019

There was little variation between Lithgow, Katoomba and Wentworth Falls (Figure 2) or by month (Figure 3).

A bimodal (double) peak is evident when observing hourly particulate measurements across all sites for Winter 2019 (Figure 4). It has been an unseasonably warm winter which may have impacted on the bimodal peak due to lower usage of solid fuel heaters. Further observation across all seasonal periods will be needed to investigate the potential sources associated with these peaks such as vehicle traffic or use of wood burning stoves, both of which produce the combustion pollutants of PM_{2.5} and CO.

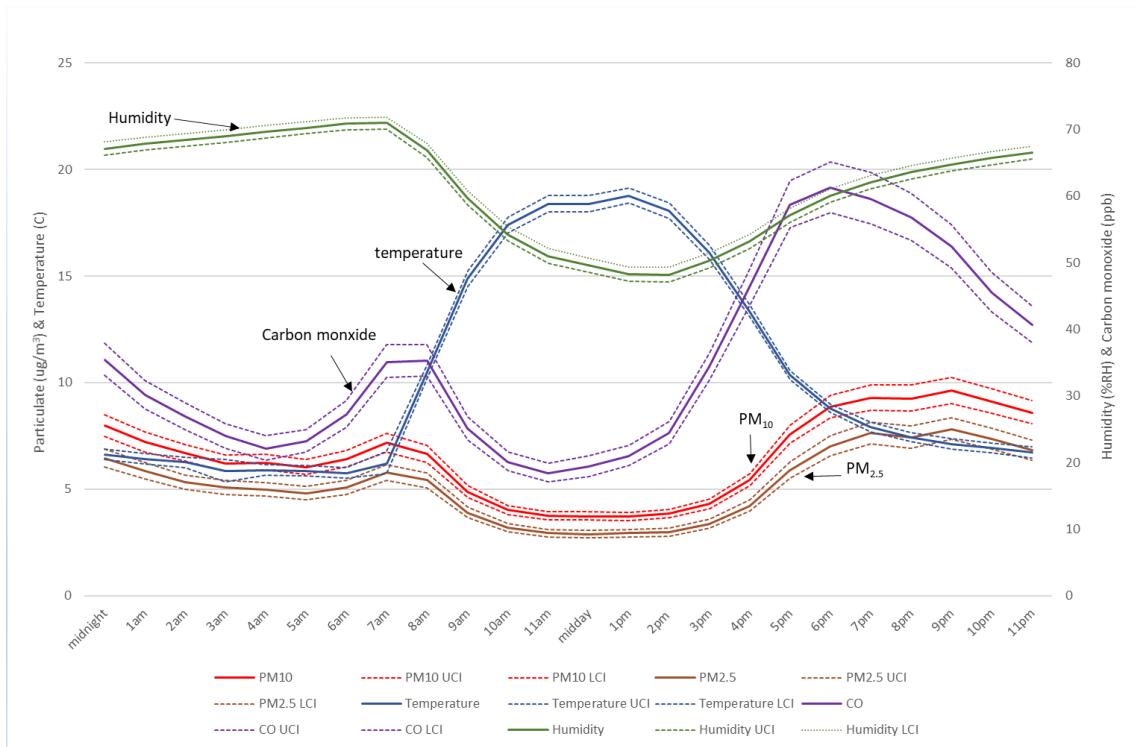


Figure 4: Hourly Fluctuations in PM₁₀ and PM_{2.5} and CO, averaged across all KOALAs for 1st June to 31st August 2019.

Please note that the data presented has not been adjusted for the effects of sensor variability, temperature or humidity. The findings presented here looks at trends and identifies where additional background data on local activities may need to be collected for individual sites.

KOALA Low-cost Sensor Carbon Monoxide Data

The hourly CO levels were extremely low, typically less than 100 ppb (0.1 ppm) averaged over an hour, and at the limits of detection for the sensor (Figure 5).

The sites where CO displayed the greatest variability were K62 (South Lithgow) and K66 (Wentworth Falls), but overall there was no significant difference between CO levels by either township or month (Figures 5 and 6). As with PM_{2.5}, pre and post co-location data will be needed to further investigated to determine if the very small shifts in measurements are related to sensor accuracy, or environmental changes.

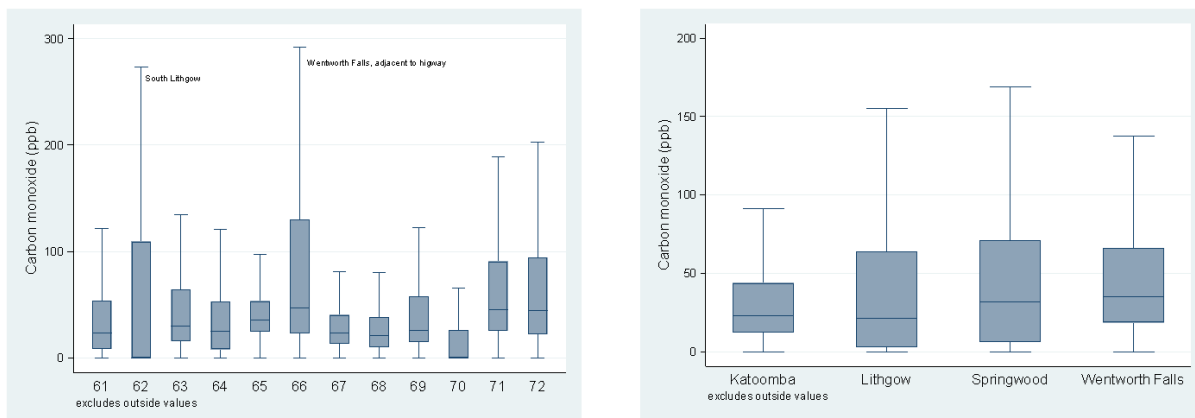


Figure 5: Comparison of Hourly Carbon Monoxide Readings by KOALA and township, 1st June to 31st August 2019.

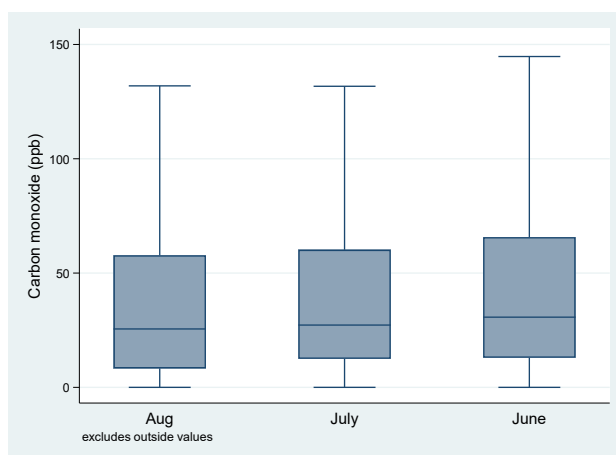


Figure 6: Comparison of Hourly Carbon Monoxide by Month, 1st June to 31st August 2019.

3. INTERIM FINDINGS

The winter period findings indicate particulate exposure in Katoomba is low and that concentrations of ozone, sulphur dioxide, carbon monoxide, nitrogen dioxide were extremely low in relation to the health based air quality standards. The collection of more data in other seasons is required to determine the potential sources of particulate matter and carbon monoxide across all sites.

Appendix A: DPIE Compliance Station Results – Winter 2019

Table A1: Comparison of Air Quality Indicator Data for NSW DPIE Stations, Winter 2019, [Geometric Mean (range) n]

Station	NO	NO₂	O₃	SO₂
	1 hour average (pphm)	1 hour average (pphm)	1 hour average (pphm)	1 hour average (pphm)
Katoomba	0.1 (-0.1 – 1.1) n=464	0.2 (-0.1 – 1.8) n=753	2.7 (1.1 - 3.8) n=2,020	0.2 (-0.1 – 1.1) n=124