Blue Mountains Air Watch project and elevated particle levels during the bushfire period in spring–summer 2019–20

Synopsis

The 12-month community-initiated Blue Mountains and Lithgow Air Watch project monitored airborne particles as PM2.5 and PM10, from 1 June 2019 to 31 May 2020.

The project included 12 low-cost air quality sensors, known as KOALAs (Knowing Our Ambient Local Air-Quality), located in communities at Katoomba, Lithgow, Springwood and Wentworth Falls.

The study found that the highest particle levels during the 12-month study period were recorded at Katoomba and Lithgow during the bushfires period in spring–summer 2019–20.

Background

The Blue Mountains and Lithgow Air Watch project was a 12-month community-initiated research project supported by the NSW Environment Protection Authority and the NSW Department of Planning, Industry and Environment, as well as local stakeholders.

The project included monitoring of airborne particles as PM2.5 and PM10 over 12 months from 1 June 2019 to 31 May 2020, using:

- 12 low-cost air quality sensors, known as KOALAs (Knowing Our Ambient Local Air-Quality), located at Katoomba, Lithgow, Springwood and Wentworth Falls (Figures 1 and 2)
- one temporary compliance air quality monitoring station at Katoomba, in the NSW Blue Mountains.

During the study, including the bushfire period in spring–summer 2019–20, the KOALA units provided near-real-time indicative air quality measurements to the community, through a website that was easy to access and understand.

Methodology

The KOALAs are solar powered, low-cost, air quality monitors designed by the Queensland University of Technology's International Laboratory for Air Quality and Health (Figure 1). The units are fitted with the following instruments:

- Plantower PMS1003 detector for PM2.5 and PM10 particulates (user manual)
- Aphasense CO-B4 gas sensor for carbon monoxide (product data sheet)
- temperature and humidity sensor
- data logger
- 3G SIM card for telemetry (wireless internet technology)
- solar panel and battery.

The KOALAs are not compliance instruments and the data cannot be compared directly to the health-based air quality standards set by the National Environmental Protection measure for ambient air quality. However, KOALAs are valuable tools for:

- detecting local air pollution sources
- assessing variability in air quality within and between localities
- community education and awareness around management of air quality.

The hourly average PM10 and PM2.5 concentrations were modified by transforming any measurement over 500 micrograms per cubic metre (µg/m^3) to a maximum value of 500 µg/m^3 which is the upper limit of detection for the KOALAs.

Source: Department of Planning, Industry and Environment

Figure 1 **A view inside a KOALA air quality monitoring unit (left) fitted with sensors for particulates (top right) and carbon monoxide (bottom right)**

Measurements during bushfire season 2019–20

Key findings of the study are listed below.

- The real-time particulate data from the KOALAs reflected the increased emission of PM2.5 and PM10 particles during the bushfire season, which peaked in December 2019 (Figure 2).
- The study found that the bushfires in spring–summer 2019–20 were the largest contributor to particulates observed in the Blue Mountains and Lithgow areas during the 12-month study period.
- The highest concentrations during the bushfire period were recorded in Katoomba and Lithgow. The monitoring stations at Lithgow and Katoomba were closest to the Gospers Mountain and Ruined Castle fires. By February 2020, the fires amalgamated with other major fires to cover approximately one million hectares

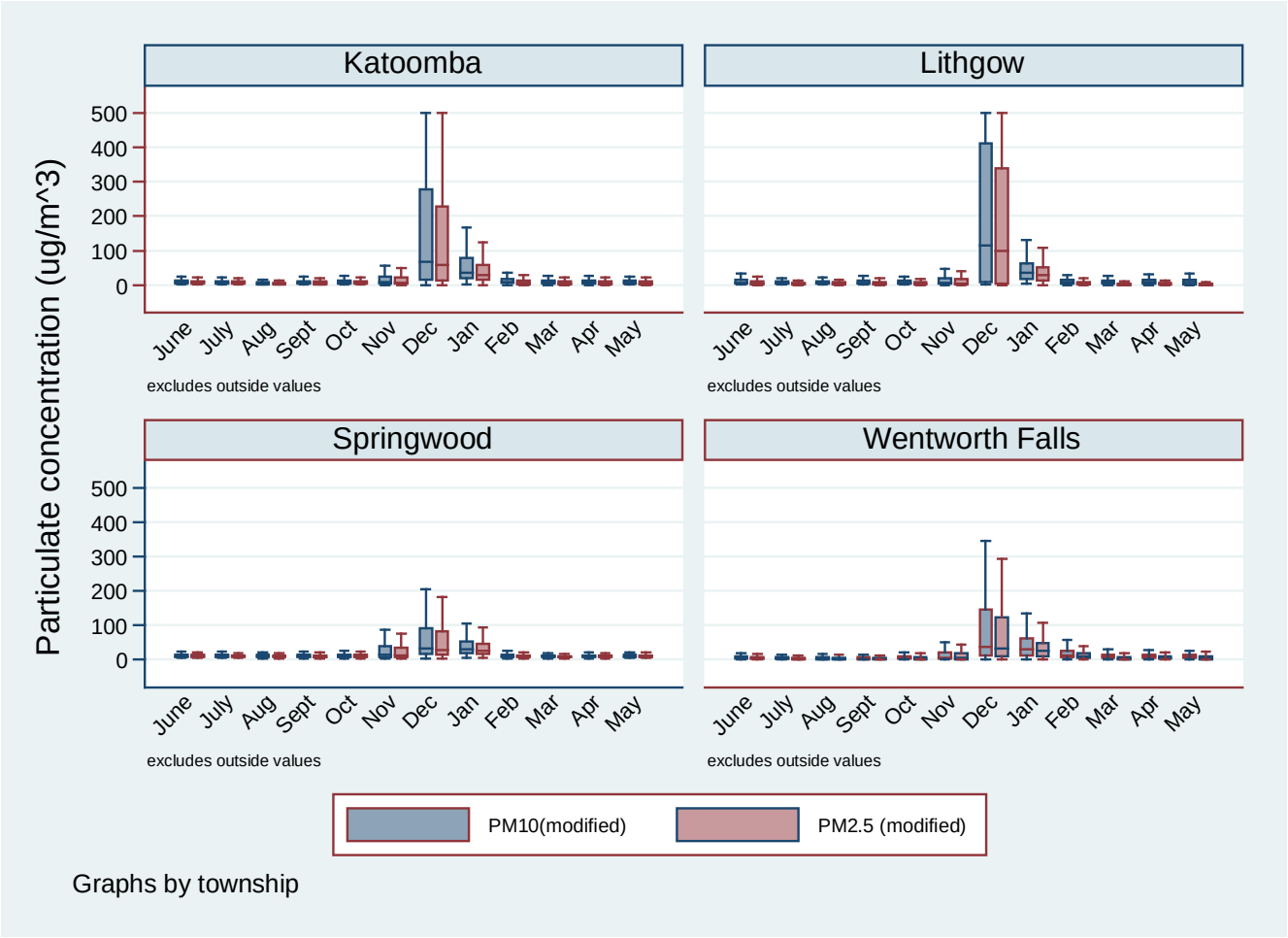

Figure 2 **Box and whisker plots of PM2.5 and PM10 values, per month, based on hourly data from each of the three clusters of monitoring stations using KOALAs during the study period. PM10 and PM2.5 values were modified by reporting measurements over 500 micrograms per cubic metre (µg/m^3) as a maximum of 500 µg/m^3, the upper limit of detection for the KOALAs.**

Summary and conclusion

- The KOALA units provided near-real-time indicative air quality measurements to local communities during the study, including the summer bushfires, through an easy to understand and access website.
- The real-time particulate data from the KOALAs reflected the increased emission of particulates during the bushfire season, with particle levels peaking in December 2019.

Acknowledgement

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Further reading

NSW EPA Blue Mountains and Lithgow Air Watch Website:
www.epa.nsw.gov.au/your-environment/air/regional-air-quality/blue-mountains-and-lithgow-air-watch

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