Air quality in NSW

Snapshot

- **Australian cities typically enjoy cleaner air than other major cities worldwide, but we cannot be complacent: climate change and population growth are both expected to worsen air pollution in Australia.**

- **The air pollutants of most concern in Australia are ozone and particles suspended in the air that are less than 2.5 microns across ($PM_{2.5}$). Even at low levels, these have been shown to be bad for human health.**

- **For the last six years, the Clean Air and Urban Landscapes (CAUL) Hub has studied the air quality of Australia's largest city – Sydney. This factsheet outlines some key findings from which every Australian city can learn.**

Background

Sydney's air quality was mostly classed as 'very good', 'good' or 'fair' between 2012 and 2018 by the NSW Department of Primary Industries and Environment (DPIE). Despite this, about two percent of deaths in Sydney can be attributed to exposure to $PM_{2.5}$ and ozone. The most severe air-pollution episodes in Australian cities are usually caused by events such as bushfires and dust storms. The 2019-20 summer bushfires exposed millions of people in Sydney, Canberra and Melbourne to hazardous air for weeks on end. Outside these episodes, concentrations of air pollutants in Sydney are dominated by anthropogenic emissions including traffic fumes and smoke from wood-burning heaters and hazard-reduction burns.

Here, we highlight key findings from CAUL's research on:

1. Traffic-related pollution;

2. Smoke from hazard-reduction burns, bushfires and wood-burning heaters;

3. The impact of urban greening on air quality.

Traffic pollution

Traffic emissions are a well-known source of air pollutants in urban areas worldwide. The concentration of air pollutants from vehicles can vary significantly over a small area, usually decreasing with distance from traffic. CAUL researchers conducted a roadside study in Randwick in Sydney's east to investigate this. We found levels of $PM_{2.5}$ at the roadside were sometimes twice those measured at nearby air-quality monitoring stations. $PM_{2.5}$ concentrations were also found to be about 50% higher in the morning peak hour compared to the evening traffic peak. This is consistent with a well-recognised pattern of morning traffic being busier and more congested.

Smoke pollution

A major source of poor air quality in Australian cities is smoke from bushfires and hazard-reduction burns. A less obvious but equally important source of smoke pollution comes from household wood heaters. CAUL researchers conducted an air-quality measurement study over the centre of Auburn, in Sydney's west, over 18 months in 2016-17. We found that although the highest pollutant concentrations were observed during controlled burns, domestic wood heaters caused greater cumulative exposure to smoke than other sources. This study also showed that the composition of smoke from bushfires and domestic wood heaters is very similar, with both containing chemicals such as formaldehyde and ammonia that are known human toxins.

Urban greening and air quality

Creating green space in urban areas by planting trees, shrubs and groundcover can have the co-benefit of reducing air pollution in locations such as busy roadsides. CAUL researchers designed an experiment to compare the effectiveness of mosses and trees at particulate removal in Wollongong, NSW. Along roadsides ranging from quiet suburban streets to busy highways, moss was more effective at removing particulate matter from the atmosphere than leaves of selected native tree species. As levels of pollution increased, mosses trapped more particulate matter. A companion study demonstrated that particulate matter trapped by evergreen leaves is absorbed deeper into the leaf structure. In contrast, particles deposited onto the leaves of deciduous trees are washed off after rain, 'refreshing' the trees' ability to remove particles.

Image: *Bryum argenteum* (pictured) was one of the moss species found to retain more particulate matter from the atmosphere per gram than the leaves of nearby native trees at a study site. Photo by Alison Haynes

How to reduce exposure to air pollution

There are several steps community members can take to reduce their exposure and contribution to both out-door and indoor air pollutants.

• Walk or cycle on side streets wherever possible, as air quality improves rapidly with distance from main roads.

• Avoid exercising during the morning peak hour when roadside pollution is often significantly worse.

• Look for opportunities to leave the car at home and ride, walk or use public transport instead. Consider switching from a diesel to a petrol or hybrid vehicle (looking for petrol with the lowest sulphur content). If you can afford the higher up-front costs, consider switching to an electric vehicle.

• Consider alternatives to wood-fired heaters in your home. If you don't have this option, the Environment Protection Authority Victoria has information on how to reduce wood smoke and how to choose the best wood to burn. Clean air indoors with an appropriate air purifier.

• Choose fragrance-free instead of fragranced products. Fragranced consumer products such as air fresheners and fragranced laundry products are sources of indoor pollution.

• Purchase or propagate indoor plants. The Plant Life Balance Index shows that adding one medium-sized plant to a medium-sized room can increase air quality up to 25%.

• If you frequently use garden equipment, consider upgrading to a product that meets new emissions standards (or, if using older equipment, wearing a mask).

E: Dr Hugh Forehead, hughf@uow.edu.au

Prof Clare Murphy, clarem@uow.edu.au

W: www.nespurban.edu.au

Way forward

CAUL's air-quality research has led to improved NSW government air-quality modelling and forecasting, and has informed government strategies on climate change, transport and energy in Sydney. But there is always more that can be done to reduce air pollutants in urban areas. The following opportunities to improve air quality in Australian cities and towns can be considered:

• Investigating policy options to reduce levels of potentially hazardous particulate matter (and other pollutants) in the air caused by domestic wood heaters in cities and some regional areas.

• Exploring policies, infrastructure and services that reduce the number of vehicles on the road. These could include improved cycleways (away from traffic hotspots), better public transport, tax deductions for public transport, congestion taxes and safe-cycling maps.

• Improving air-quality monitoring and modelling, and the communication of relevant air-quality information in near-real time. Work is already underway for a consistent approach across the country. This will be especially valuable for vulnerable members of the population.

• Placing buildings such as pre-schools, childcare centres, schools, hospitals and aged care homes away from traffic hotspots and valleys prone to weather conditions that trap pollution near the ground. This will help protect vulnerable members of the community from air pollution.

• Encouraging planning approaches that ensure high-rise buildings are set in ample green space, with a focus on plant species that can efficiently remove particulate matter from the atmosphere. This would improve air quality where many people live together in high densities.

Sources

Paton-Walsh et al. (2019). *A Clean Air Plan for Sydney: An Overview of the Special Issue on Air Quality in New South Wales. Atmosphere,* 10 (12), 774.

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