

'Unacceptable costs': Savanna burning under Australia's carbon credit scheme is harming human health

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Credit: cottonbro studio from Pexels

Savanna burning projects in northern Australia provide [economic benefits](#) to Indigenous communities and claim to [reduce](#) greenhouse gas

emissions. But our research suggests smoke from these projects is harming human health.

Northern Australia's savannas cover [about 25%](#) of Australia's land mass. They're among the most flammable regions in the world and comprise 70% of Australia's [fire](#)-affected area each year.

Savanna fire management involves strategically burning grasslands early in the dry season, purportedly to reduce the chance of large, intense, more carbon-intensive fires later in the season. Under Australia's Emissions Reduction Fund, land managers who undertake savanna burning receive financial rewards in the form of carbon credits.

But our research, focused on Darwin, has [shown](#) savanna burning under the fund is making [air pollution](#) worse. A [review](#) of the fund now underway must consider these unacceptable costs to human health.

The Top End's smoke problem

Savanna fire management is currently a topic of substantial global interest—much of it stemming from its potential to reduce carbon emissions.

The [underlying premise](#) is that early dry season burning releases fewer emissions than late dry season burning. This is because the fuel is moister and [weather conditions](#) milder—hence fires will be less extensive, less fuel will combust and less carbon will be released.

In Australia, savanna burning programs for carbon abatement were developed in the mid-2000s and integrated into the carbon market. Land managers are offered financial incentives to burn large amounts of savanna before the end of [July](#) each year.

The scheme has proved popular: registered projects now cover some [25%](#) of Australia's 1.2 million km² tropical savannas, including [55%](#) of land within 500km of Darwin.

Australia now touts itself as a [world leader](#) in savanna burning. We are sharing the practice with other regions around the world, and savanna burning programs linked to carbon markets have been proposed [elsewhere](#).

Yet the smoke pollution consequences of such programs are rarely considered. In Australia's Top End, for example, thick and prolonged smoke blankets communities every dry season. Darwin, a city of 158,000 people, regularly [exceeds](#) the Australian air quality standard for particulate matter.

In Darwin, smoky days bring more hospital admissions for [lung and heart disease](#), and more emergency department presentations [for asthma](#). These impacts [disproportionately](#) affect Indigenous people.

Almost all Darwin's particulate pollution is caused by landscape fires. In the early dry season, almost all of this is generated by prescribed burning—and there's been a marked increase in burning in recent years linked to carbon abatement schemes.

What our research found

Our research considered the relationship between prescribed burning and smoke pollution in Darwin from 2004 to 2019.

We first assessed the very small particles found in smoke known as PM_{2.5}. We then analyzed fire activity within a 500km radius, and assessed the links between pollution, weather and fire.

The [results showed](#) air quality worsened in Darwin in the early dry season (particularly in June and July), with an increase in the annual number of severely polluted days.

Perhaps surprisingly, air quality did not change substantially in other seasons. In other words, shifting savanna burning to the early dry season did not appear to lead to better air quality later in the season.

Our findings highlight a complex story. Despite a substantial expansion of savanna burning for carbon abatement over our study period, net annual PM2.5 concentrations in Darwin did not decline. In fact, there was an increase in the number of times the national air quality standard was exceeded.

So what's driving these results? One important factor involves large areas of savanna burned for [carbon](#) abatement to the southeast of Darwin in the early dry season. At that time of year, a steady south-easterly trade wind hits Darwin, bringing much of the smoke from these fires with it.

Fuel dynamics may also be at play. Native and non-native grasses which are highly flammable in the early dry season have been [expanding](#) on frequently burned savannas. Higher temperatures may be drying fuel out earlier in the dry season. These factors may make early dry season fires as extensive and intense as savannas burnt later in the season.

Our research comes with caveats. For example, we drew only broad inferences about the geographic sources of smoke over Darwin. Notwithstanding this, our results clearly demonstrate Darwin's already significant air quality problem is worsening, rather than improving, in association with increased early [dry season](#) burning.

A balancing act

None of this means savanna burning should cease, nor that traditional owners should not be paid to manage fire on country. But it does mean policies should be designed so unintended harm is minimized and the benefits are maximized.

Policymakers must consider how to regulate burning to avoid smoke pollution exposure. In Darwin, particular attention may be needed in locations southeast of the city. One solution may be to regulate how much smoke can be released in a specific area on a given day.

Other factors should be considered too. For example, [savanna](#) burning in Australia [may](#) risk [harming biodiversity](#).

But the Emissions Reduction Fund is a blunt tool which doesn't consider these hidden costs and [other nuances](#).

The new Labor government has ordered an independent review of the fund. For this review to fulfill [its brief](#), all unintended harms must be taken into account.

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