Delhi firecracker ban had no impact, say studies

Pollution levels recorded in the National Capital Region on Deepavali and the two following days were in close agreement with forecasts that assumed that the entire stock of unsold firecrackers in the city was used.

This data indicates that a October 9 Supreme Court ban on the sale of firecrackers in the city had no effect, and partly explains why air pollution remained severe despite it.

The idea behind the Supreme Court judgment was to test whether reduced firecracker use could alleviate the noxious pollution in Delhi during winter.

Three scenarios

To forecast pollution levels on October 19, 20 and 21 as a result of this ban, Goa-based research group, Urban Emissions, simulated three scenarios using weather and emissions data.

In the first, the ban led to no reduction in firecracker use; in the second, there was a 25% reduction while in the third, the drop was 50%.

"The pollution peaks only matched at 0%. This means that there was no effect of the ban on what people managed to burst," said Sarath Guttikunda, the director of Urban Emissions.

For example, the peak forecast for PM 2.5, or fine particulate matter, in the 0% scenario was 580 micrograms/cubic metres for October 20, the day after Deepavali, while the actual number averaged from 20 monitoring stations on the same day was 617.3 micrograms/cubic metre. Similarly, PM 10, carbon monoxide, nitrous oxide and sulphur dioxide trends under the 0% scenario also matched actual numbers. To arrive at the forecast, Mr. Guttikunda's team modelled emissions across Delhi and its satellite cities from bursting 50,00,000 kg of firecrackers, a number cited by firecracker distributors in documents submitted to the Supreme Court after the ban. The colouring of firecracker explosions comes from the salts of chemicals such as magnesium and aluminium, while the fuel is gunpowder made from charcoal and sulphur. "When burst, all salts that produce colours end up straight into PM2.5 and PM10, and sulphur in the gunpowder ends up in SO2," said Mr. Guttikunda.

Interestingly, despite the high usage of firecrackers in 2017, pollution levels remained relatively low on Deepavali day compared to last year. This is because winter pollution levels are affected by several other factors which vary from one year to the next, including paddy stubble burning in the Indo-Gangetic plains, use of diesel for heating, and cold weather that prevents the dispersion of pollutants.

Pollution last year

In 2016, Deepavali fell on October 30, by when crop-burning (which typically occurs in the last two weeks of October) had already peaked in Punjab and Haryana.

Further, slow westerly winds carried this pollution towards Delhi. Within Delhi itself, wind speeds were low, affecting dispersion. In contrast, Deepavali in 2017 fell on October 19, when crop burning had just begun, said Mr. Guttikunda. Helping Delhi further, strong winds within the Delhi region dispersed the pollution faster.

Meanwhile, another forecasting model, the System of Air Quality and Weather Forecasting and

Research (SAFAR), also ran three simulations for pollution levels on six days around Deepavali, assuming that the stock of firecrackers burnt was 25%, 50% and 100%, respectively, of 2016 stock. According to Gufran Beig, project director of SAFAR, actual pollution levels seen during these days matched the 100% scenario. Rather than use actual stock numbers as Urban Emissions did, SAFAR attributed a portion of the emissions last Deepavali to firecrackers, and used this to develop this year's forecasts.

The failure of the ban didn't come as a surprise to Mr. Guttikunda or other experts, given how late it was imposed. The high pollution despite the ban also showed that other pollution sources, such as vehicular emissions, have been neglected by the government, said Amit Bhatt, who studies sustainable cities at the World Resources Institute, Delhi.

"While episodic events like Deepavali contribute to 4-5 days of bad air, what happens during the rest of the year? Many of us are disappointed because we haven't seen any tangible action for these remaining 360 days," said Mr. Bhatt.

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