

## How Pollution in Europe is Creating Ghost Towns in India

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*Pollution in Europe has contributed to one of the worst droughts in India which has destroyed the lives of more than 130 million people, [according to a new study](#). Researchers believe **manufactured aerosols** are to blame for the weakening of monsoon winds and rain in India over the past few decades.*

Emissions from the northern hemisphere's main industrial areas caused a staggering 40 per cent drop in rainfall in north west India in 2000, according to researchers from Imperial College London. Europe's emissions alone caused levels of rainfall to fall by ten per cent in the same year.

Sulphur dioxide – produced mainly by coal-fired power plants – causes [a number of harmful effects](#), such as acid rain, heart and lung diseases, and damage to plant growth. Now researchers at Imperial College London have calculated just how big an effect emissions of sulphur dioxide had on rainfall in India in 2000.

The north-west of India experienced a staggering drop in precipitation of about 40 per cent because of emissions from the northern hemisphere's main industrial areas. Aerosols, which release sulphur dioxide and stay in the atmosphere for weeks, can both reflect and absorb solar radiation. They also affect cloud cover – and can make them brighter and suppress rainfall. Although they are produced naturally from sea salt spray and desert dust, man-made aerosols make up a major part of this pollution.

One of the researchers, **Dr Apostolos Voulgarakis**, of ICL's Grantham Institute, said the study showed how emissions in one part of the world could have a significant effect on another – even if the pollution itself didn't actually get there. Dr Voulgarakis said their research, along with other studies, showed the kind of problems that might result from attempts to use sulphur dioxide in a geo-engineering scheme.

“Geo-engineering has generally suggested to be problematic because of the knock-on effects it could have,” he said. “This research shows one of those reasons as it can affect rainfall quite dramatically.”

### How does European air pollution affect the South Asian monsoon?

In a [blog post](#) researcher **Dilshad Shawki** from ICL's Grantham Institute explains how understanding and predicting monsoon rainfall is of huge importance to those societies like

India that have developed following its rhythms.

Aerosols are liquid and solid particles suspended in the atmosphere that have the ability to reflect or absorb solar radiation. They also influence clouds by making them brighter and even suppressing rainfall. Aerosols can also occur naturally from sea salt spray and dust plumes driven by winds in desert regions, but synthetic aerosols make up a major part of global air pollution. Whether manufactured or natural, aerosols remain in the atmosphere for days to weeks, which makes their direct influence on the climate more localised. Interestingly though, local differences in temperature and pressure can influence circulation – and hence the climate – in areas far away from the emission source.

The South Asian monsoon's interaction with aerosols has been studied extensively in recent years, with many researchers concluding that manufactured aerosols may be responsible for weakening the circulation of monsoon winds and precipitation in recent decades. These changes matter to people on the ground. In the second half of the twentieth century, drier conditions in central India have led to more frequent and intense droughts, and a devastating effect on crop yields.

Each summer the South Asian monsoon drenches the Indian subcontinent, as strong moisture-laden winds from the Indian Ocean deliver over 70% of the region's annual rainfall in just 3 months. As such, the monsoon's bountiful rain is crucial to the economy and to livelihoods in the region. In recent decades however, rising pollution levels and increases in global surface temperatures have influenced atmospheric circulation patterns in the tropics, in turn affecting monsoon rainfall patterns.

### **Villages Turning Into Ghost Towns**

Hit hard by this man-made European drought [villages in India are turning into Ghost Towns](#), chief among them is the Anantpur district of the South Indian state of Andhra Pradesh. Last year, India saw its highest temperature on record – [a sweltering 51 degrees Celsius \(123.8F\)](#). Hundreds of farmers died as crops failed in more than 13 states. More and more farmers are gearing up to leave their villages and migrate to cities leaving the elderly and kids behind to use last traces of water while the able-bodied earn a fighting wage in the cities. With the economy collapsing over large swathes, people migrate as a last resort.

Thanks to deficit rainfall more farmers are gearing up to leave in the next two months. The few who remain survive by selling milk and doing odd jobs that fetch them not more than Rs 100 a day. This is not a case of just one state. Farmers across the country are facing similar situation. Recently in a dramatic move, 150 farmers from the South Indian state of Tamil Nadu protested at New Delhi's Jantar Mantar with skulls of fellow dead farmers who had allegedly committed suicide.

The [drinking water ministry](#) has asked 18 drought-prone states to utilise 25% of the Central budget available with them to mitigate drinking water crisis. While 13 states were identified last year as drought-prone, the ministry has assessed another five states as the ones facing drinking water scarcity this year.

While the entire nation is grappling with one of the deadliest droughts to hit the region deciphering the root causes of monsoon changes in the past and the various scenarios of monsoon change in the future will be an ongoing challenge for climate researchers.

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