

Impact of COVID-19 response on air pollution in Bengaluru

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Summary

For this assignment, NASA satellite data and government ground sensor observations were used to get a clear picture of varying air pollutant levels in Bengaluru over the past 2 years. This was then matched with the timeline of shifting regimes of lockdown restrictions in Bengaluru, with mobility data validating the considerable shift in human activities.

A strong positive correlation can be seen between levels of social and commercial activities and levels of air pollutants. Looked at more holistically, the burning of fossil fuels is clearly central to the everyday social and commercial functioning of an urban society like Bengaluru, and is a major contributor to the degradation of air quality.

Geospatial data used and Takeaways

This solution allowed a lot of learning regarding different sources of geospatial data and the wide range of detail and quality in available data products. The TROPOMI instrument aboard the ESA's Sentinel-5p satellite has processed datasets of a number of environmental indicators, an improvement over the raw spectral data of Sentinel-1 and 2. However, their training material is region-blocked, and additional difficulties were faced in downloading data and using their API, which was a learning experience.

However the aerosol optical thickness data from NASA's Terra satellite was useful in illustrating the drop in levels across the entire region during the pandemic. Additionally, the global geotagged air quality data offered by OpenAQ through their open-source API, was instrumental in accurately tracking trends in a number of air pollutants. One of the key takeaways was how ground sensor data, although limited in scope, can be more reliable and noise free compared to satellite observations. ArcGIS was also used to visualise the spread of ground sensors across Bengaluru.

Future improvements

Given the open-ended nature of the problem, there are a lot of potential improvements that could be done.

- Better sources of satellite data with more consistent observations for a longer time period could be considered. Tracking longer term trends would help refine the baseline expectations, for example ensuring that there isn't a longer term decline in air pollution from earlier years which might explain some of the decline in 2020.
- Commercial and industrial activity trends could help understand the differentiated impacts of the lockdown across Bengaluru.
- Other environmental indicators like forest fires, land use change, glacier cover in different regions could also be similarly studied, to try to understand which of these was affected by widespread reduction of human activities, and to what extent.