

Environmental Impacts of Coal Use in China

Background

Since the economic reform in 1978, China has focused on economic growth and poverty alleviation. For the past three decades, the country has achieved an average annual growth of 10%, lifting more than 500 million people out of poverty. However, such unprecedented growth is achieved at the cost of environment .



The central government has enacted various legislative measures to address air pollution issues. Relatively more developed coastal areas in the east have been willing to adopt the new legislation because local governments respond with more detailed

measures after receiving increasingly acute demand from citizens on environmental protection, and emitters are likely more able to afford higher technology to mitigate emissions. The question is whether the less developed inland areas will follow the environmental targets, as many of them may be dependent on heavy industry and power plants.



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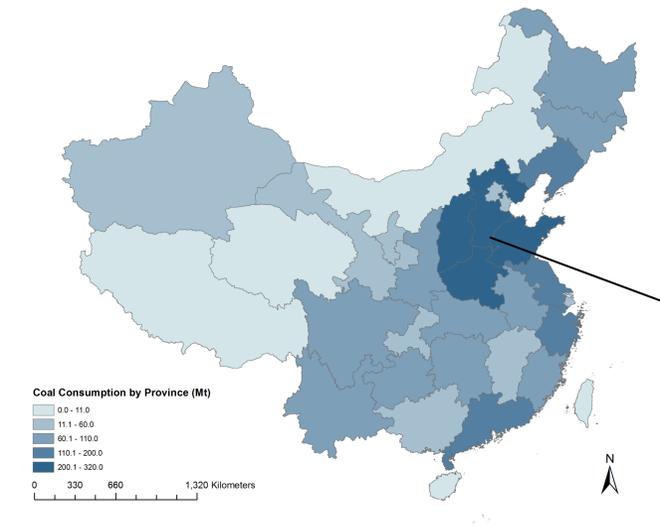
The objective of the project is to find out where the provinces with highest PM 2.5 emissions are, and whether the high emissions are associated with high coal consumptions by coal fired plants. Then the project examines the GDP data on provincial levels in order to identify more vulnerable provinces by combing relative high PM 2.5 levels and low GDP.

Methods

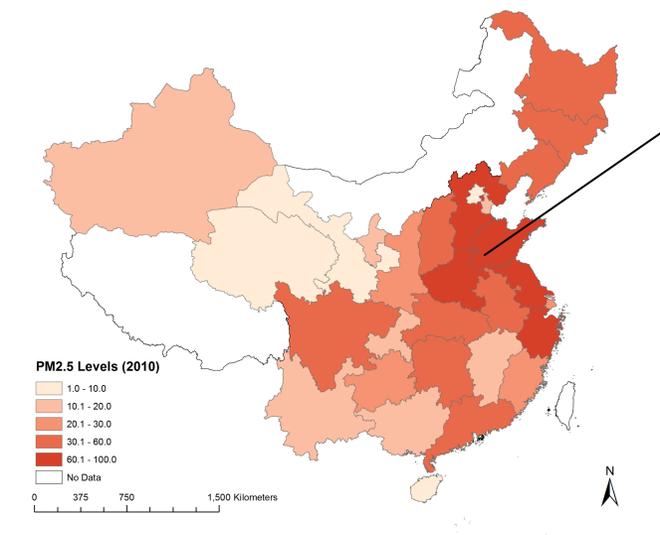
Correlation between coal consumption by coal powered plants and PM 2.5 emissions: the project uses research data on coal fired plants' annual coal consumption, and combines with the annual PM 2.5 emissions of each province to determine whether there is a positive relationship between these two variables.

Vulnerability analysis: in order to determine each province's ability to tackle air pollution problem, the project use two variables: existing PM 2.5 levels and GDP per province. The project assigned low scores to high existing PM 2.5 emissions and low GDP. These two factors will make it harder for local governments to handle air pollution. Low total scores indicate provinces which are vulnerable to handle air pollution.

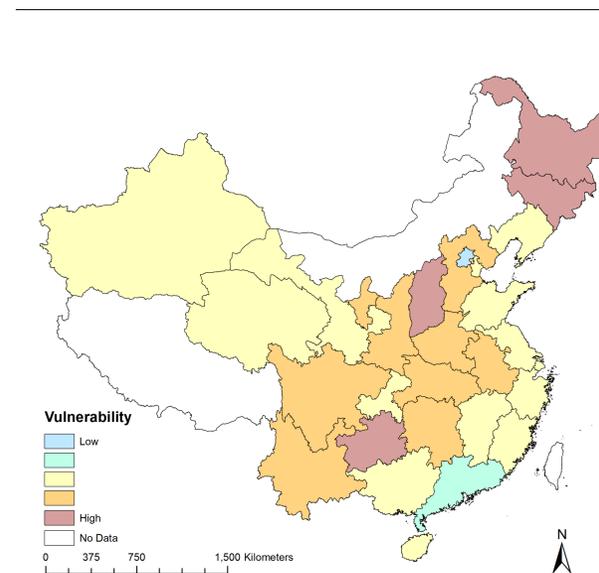
Coal Consumption by Coal Powered Plants (2007)



PM 2.5 Levels (2010)

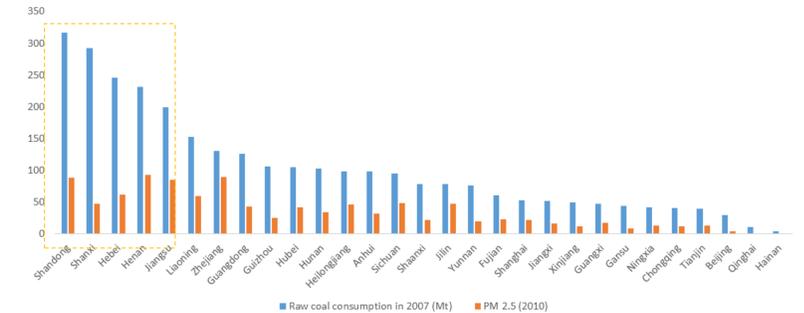


Provinces in red and yellow colors are more vulnerable to air pollution .



Conclusion

Coal consumption contributes to higher PM 2.5 emission levels. Provinces with large coal consumptions, such as Shandong, Hebei, Henan, and Jiangsu, generally have relatively higher PM 2.5 levels. Such findings is associated with policy implication. If the central government is serious to curb air pollution issue in China, it should be considering reducing coal reliance as the energy source.



Provinces such as Shanxi, Jilin, Guizhou and Heilongjiang, are particularly vulnerable to air pollution issue, as all of which score low on the total scores of existing PM 2.5 levels and GDP per province. In particular, Shanxi, Jilin and Heilongjiang provinces have relative moderate existing PM 2.5 emission levels ranging from 40—45, however, due to the low GDP per province, it would still take some efforts for the local governments to effectively address the air pollution problem. Guizhou has the similar issue, as it scores relative high on PM 2.5 level, meaning it has relatively low PM 2.5 emissions. But Guizhou province's GDP level is among the bottom, it faces challenges to address air pollution issue as well.

Reference

The China Data Center, Tufts M Drive, Tian, H. Z., Zhao, D., He, M. C., Wang, Y., & Cheng, K. (2011). Temporal and spatial distribution of atmospheric antimony emission inventories from coal combustion in China. *Environmental Pollution*, 159(6), 1613-1619, Zhao, Y., Wang, S., Duan, L., Lei, Y., Cao, P., & Hao, J. (2008). Primary air pollutant emissions of coal-fired power plants in China: Current status and future prediction. *Atmospheric Environment*, 42(36), 8442-8452.

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