Relation between Air Quality and Forest Cover

Trees are essential for life on Earth. Are we caring for them responsibly?

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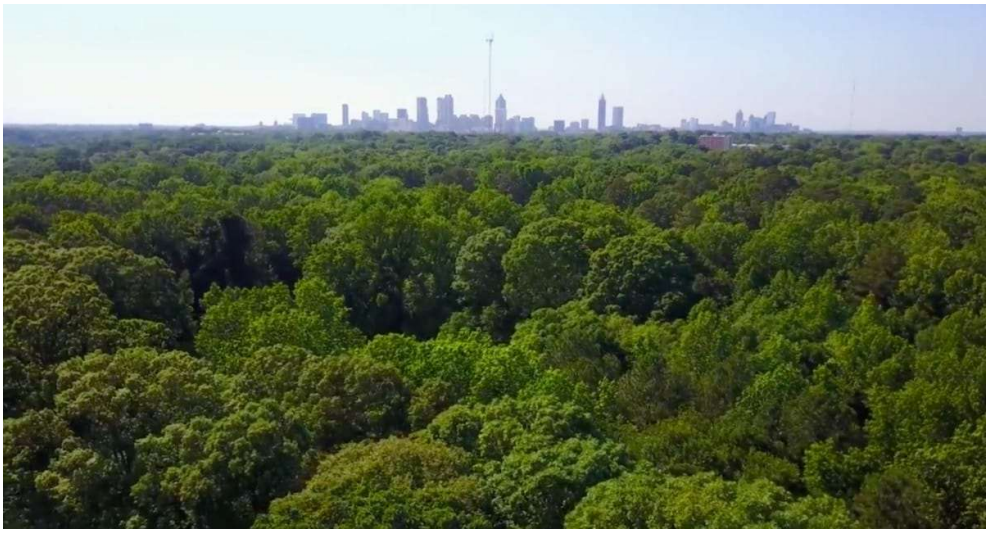
Draft



Not only do trees produce oxygen, but they also improve air quality in some unexpected ways.

We've all heard it — we need oxygen from trees to survive. It's the primary campaign from tree lovers around the world in our quest to save the forests. However, although oxygen is important for survival, it is not the only air quality improvement maneuver for which trees should be praised.

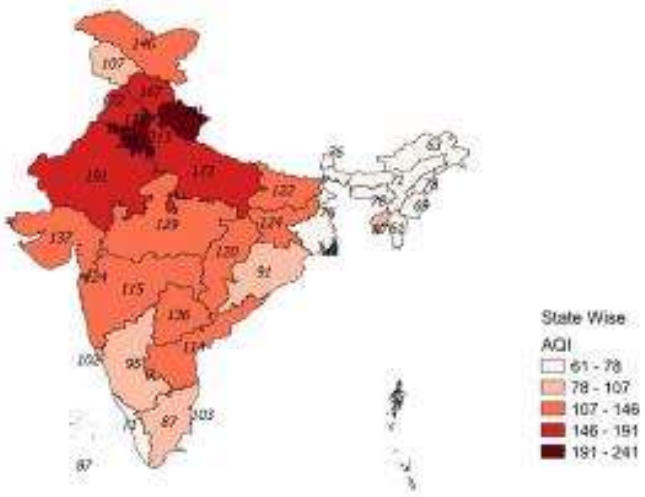
A lesser known, yet equally interesting, feature of trees is how they cool air through
evapotranspiration. As trees transpire, they release water into the atmosphere through their leaves. As the water changes state from liquid to vapor, the surrounding air is cooled, similar to how we sweat. This effect is especially beneficial in urban areas where heat is trapped by concrete and asphalt surfaces and can make summer days unbearably hot. Especially in recent years, where global temperatures have spiked, trees can offset increased temperatures on a local scale.

Another way trees can benefit urban areas and make it easier for us to breathe is through particulate matter capture. Forests can improve public health greatly by catching dust, ash, pollen and smoke on their leaves, keeping it out of our lungs.

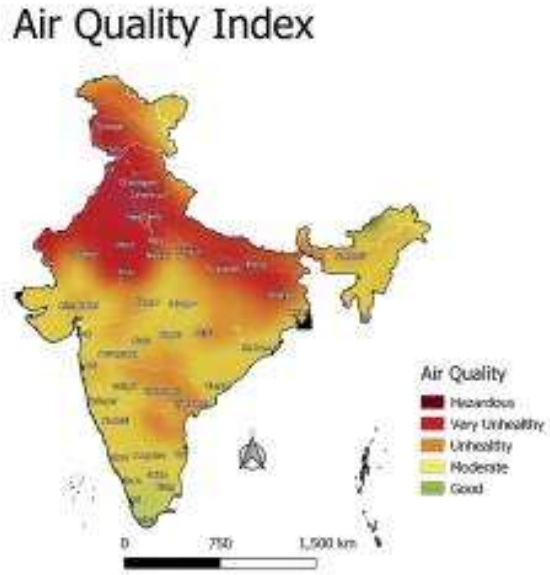
But, particulate matter is not the only atmospheric pollution from which trees protect us. Trees are sinks for other harmful pollutants, such as nitrogen oxides, ammonia and ozone, which can all cause respiratory problems from repeated exposure. Although ozone deflects harmful UV rays in the upper atmosphere, ground-level ozone is very dangerous and is linked to asthma. Trees are effective air filters by design, filtering out not only gasses that are harmful to humans, but also harmful to the earth's ecosystems as a whole. Carbon dioxide is one of the most harmful greenhouse gasses, and filtering carbon dioxide out of the air is what trees do best.

Data collection and processing

The air quality data data across 29 states of India. The Air Quality Index (AQI) describes the degree of cleanliness or pollution of the air and its impact on health. It has no dimensions.

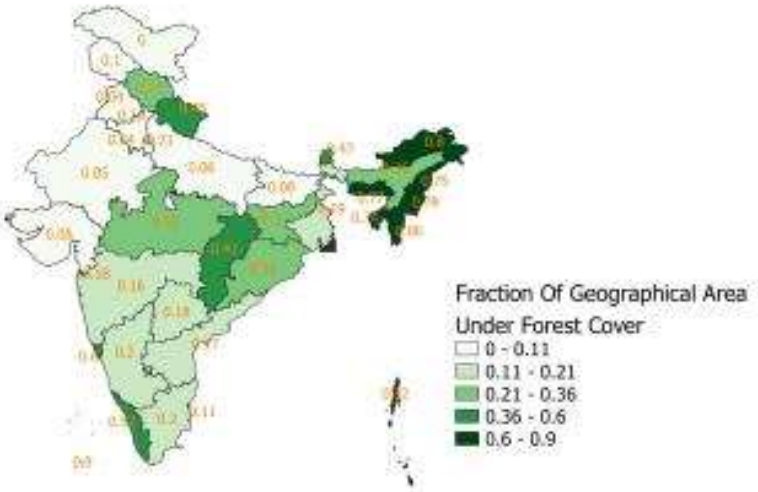


The air quality data data across 29 states of India.



Georeference data for Air Quality Index

The forest cover data across 29 states of India. Forest cover is the amount of land area that is covered by forest. It may be measured as relative (in percent) or absolute (in square kilometers / square miles).



The forest cover data across 29 states of India

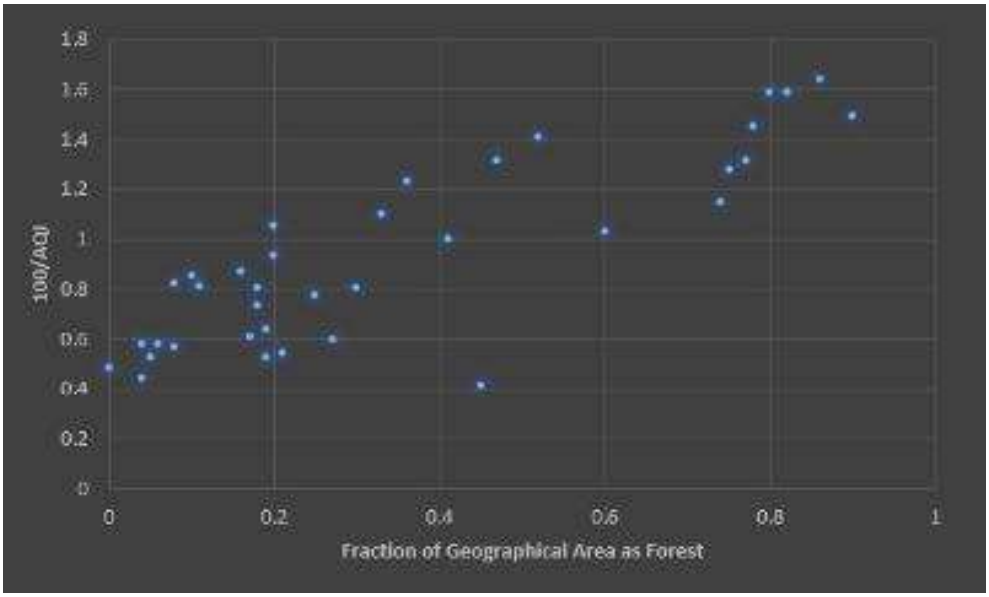
Georeferenced data for Forest Cover in India

The results indicated that the Air Quality Index (AQI) values were the lowest for the forest land in the months which mean that the forest land was the most convenient place for health. The increase the AQI, air pollution also increases. In the forest areas, the AQI values for the months were the lowest. This indicated that the most suitable places for health are the places with a high forest coverage rates. There was no forest area within the region where the AQI values were the highest, so the risk was maximum.

The Relation between Air Quality and Forest Cover

After collecting the data of AQI of various states, its data was plotted against fraction of forest coverage of those states.

It was observed that that, although not perfectly linear, with increase in fraction of forest coverage the quality of air breathed by the citizens of the state also improved. The increase in quality of air is scattered between forest coverage of 0-0.2 of the total geographical area. However as the fraction hits 0.4, there is big increase in air quality among the states.



AQI vs Forest Cover graph

Conclusion

This brings us to a conclusion that increase in forest area is directly linked to the quality of air in the states thus proving how vital they are for the survival of the mankind itself.

Hence, Authorities should take initiatives to create new afforestation areas and rehabilitate degraded forest lands to limit air pollution by increasing the quality of urban life.