Researchers suggest reforestation around urban areas to reduce ozone levels

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Credit: Yinan Chen/public domain

(Phys.org) —A team of research conservationists with members from several universities in the U.S. is suggesting in a paper they've had published in *Proceedings of the National Academy of Sciences*, that urban areas could benefit by investing in cost effective reforestation efforts around urban areas that currently suffer from high ozone levels. Planting trees, they suggest could help cities bring those levels down.

The researchers note that despite aggressive efforts by many metropolitan areas to lower ozone levels in ground level air, levels remain high, causing the populations that live in them to live with an increased risk of health problems—prior research has indicated that as many as 152,000 premature deaths each year can be attributed to the damage ozone inflicts on lungs. Current efforts to combat ozone levels are aimed at the source, factory emissions, etc. Laws limiting emissions have not kept up with growth however, leading to increases in ozone levels. The researchers suggest a different approach—remove the ozone by planting trees. They suggest that land be purchased on the outskirts of cities with high ozone levels to be converted to forest—trees they note, remove both ozone, and one of its precursors.

To bolster their point, the researchers looked at the Houston metro area in Texas, a part of the country with consistently high ozone levels. Land that is currently used for agriculture on the outskirts, they claim, could be purchased and replanted with trees, creating a 1.5-square-mile forest. They estimate that over a 30 year period, the reforested area could reduce ozone and precursors in ground-level air by 310 tons. They also note that if fast growing trees were planted, timber harvests could help make up initial outlays and loss of local revenue from agricultural products.

The researchers also plotted potential targets on a map of the U.S., highlighting areas where reforestation would likely do the most good—along the I-95 corridor in the northeast, for example, and around Chicago, Detroit and many parts of California. The team concludes by noting that if something isn't done, the problem of ozone pollution is only likely to get worse in the face of both continued growth and as global warming exacerbates the problem.

More information: Reforestation as a novel abatement and compliance measure for ground-level ozone, Timm Kroeger, *PNAS*,

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Abstract

High ambient ozone (O3) concentrations are a widespread and persistent problem globally. Although studies have documented the role of forests in removing O3 and one of its precursors, nitrogen dioxide (NO2), the cost effectiveness of using peri-urban reforestation for O3 abatement purposes has not been examined. We develop a methodology that uses available air quality and meteorological data and simplified forest structure growth-mortality and dry deposition models to assess the performance of reforestation for O3 precursor abatement. We apply this methodology to identify the cost-effective design for a hypothetical 405-ha, peri-urban reforestation project in the Houston–Galveston–Brazoria O3 nonattainment area in Texas. The project would remove an estimated 310 tons of (t) O3 and 58 t NO2 total over 30 y. Given its location in a nitrogen oxide (NOx)-limited area, and using the range of Houston area O3 production efficiencies to convert forest O3 removal to its NOx equivalent, this is equivalent to 127–209 t of the regulated NOx. The cost of reforestation per ton of NOx abated compares favorably to that of additional conventional controls if no land costs are incurred, especially if carbon offsets are generated. Purchasing agricultural lands for reforestation removes this cost advantage, but this problem could be overcome through cost-share opportunities that exist due to the public and conservation benefits of reforestation. Our findings suggest that peri-urban reforestation should be considered in O3 control efforts in Houston, other US nonattainment areas, and areas with O3 pollution problems in other countries, wherever O3 formation is predominantly NOx limited.