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Barriers by Roadways: The Efficacy of Long Beach's Great Wall of Mulch in Reducing Pollutant Concentrations in Adjacent Areas

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Research Topic

Air pollution near highways is a public health concern, especially in densely populated urban areas. Exposure to roadway pollutants is associated with negative health outcomes, raising concerns for sensitive areas like homes, schools, and parks located next to highways. Roadside barriers are a mitigation strategy commonly used to reduce the exposure of nearby communities to air pollution. Barriers, like sound walls and vegetation, generally divert and disperse emitted pollutants, resulting in lower pollutant concentrations behind the barriers.

The effectiveness of a barrier in reducing pollutant concentrations depends on a number of factors, including physical characteristics of the barrier. While studies have shown that traditional solid barriers reduce pollutant concentrations downwind of the barrier by upwards of 50 percent compared to open road values, the impacts of unconventional barriers are less clear.

In 2013, the City of Long Beach installed a novel type of barrier, called the "Great Wall of Mulch," constructed using mulch contained within a chain link fence enclosure. The barrier separates a park from a highway with large volumes of truck traffic, and it was touted by city officials as mitigation for nearby freight and industrial activity. But how effective was the barrier at reducing pollutant concentrations? To answer this question, researchers at UCLA examined air quality surrounding the Great Wall of Mulch. Their findings can help inform the design of similar barriers in the future.

Study

Researchers at UCLA conducted measurements of ultrafine particles surrounding the Great Wall of Mulch using hand-held instruments and instruments installed in an electric vehicle. The research team conducted measurements during afternoons when the wind was roughly perpendicular to the freeway, when the park was most impacted by nearby pollution sources.

Main Findings

- The air quality at Hudson Park is consistent with a moderate amount of pollution reduction behind the Great Wall of Mulch. Part of the observed reduction, however, may be due to tall trees planted in the park near the barrier.
- There's still room for improvement: A very effective barrier would usually result in even less air pollution than that observed at Hudson Park. The research team suggests that the effectiveness of similar barriers could be improved by increasing their height.

Recommendations

- Where funding is limited, public health officials and transportation practitioners should install structures similar to the Great Wall of Mulch as low-cost alternatives to traditional barriers.
- In areas with especially high levels of air pollution, like that of the study area, transportation engineers and planners should design for taller roadside barriers — upwards of 20 feet — to better divert and disperse roadway pollutants in nearby communities.

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