Air Pollution

1-Water Quality, Air Pollution, and Climate Change: Investigating the Environmental Impacts of Industrialization and Urbanization

By Saxena, V (Saxena, Vivek) [1] (provided by Clarivate) Source WATER AIR AND SOIL POLLUTION Volume 236 Issue 2 DOI 10.1007/s11270-024-07702-4 Article Number 73 Published FEB 2025 Indexed 2025-01-09 Document Type Review

Abstract

Human activities profoundly impact both biotic and abiotic components of ecosystems. Pollution, defined as the introduction of harmful substances into the environment, poses a significant threat to all living organisms. Even minimal concentrations of pollutants-whether in gaseous, liquid, or solid form-can disrupt ecosystem health. The advent of the Industrial Revolution marked the beginning of large-scale pollutant emissions, leading to severe repercussions for both human health and the environment. While the Industrial Revolution facilitated numerous advancements in services, science, and societal progress, it also introduced substantial environmental challenges. Today, the unprecedented levels of industrialization and urbanization have amplified global environmental concerns. Human-induced air pollution alone accounts for approximately 9 million deaths annually, presenting a critical public health threat. This research examines the environmental contamination arising from human activities, with a focus on water quality, air quality, and climate change. It aims to provide a comprehensive understanding of the environmental impacts of human actions, highlighting the pressing global issue of water pollution, particularly in developing countries. The study underscores the crucial role of effective wastewater treatment in achieving sustainable development and explores how such measures can mitigate the impacts of climate change.

Keywords
Author Keywords
Air QualityAtmosphereHuman HealthPollutionWater Quality

Keywords Plus
HEALTHOPPORTUNITIESEXPOSURE

Air Pollution

2-Nonlinear and threshold effects of the built environment, road vehicles and air pollution on urban vitality

---

By Doan, QC (Doan, Quang Cuong) [1] ; Ma, J (Ma, Jun) [1] , [2] ; Chen, ST (Chen, Shuting) [1] ; Zhang, XH (Zhang, Xiaohu) [1] , [2] (provided by Clarivate) Source LANDSCAPE AND URBAN PLANNING Volume 253 DOI 10.1016/j.landurbplan.2024.105204 Article Number 105204 Published JAN 2025 Early Access SEP 2024 Indexed 2024-09-30 Document Type Article

Abstract

The impact of factors such as the built environment, road vehicles, and air quality on urban vitality attracts increasing interest in urban planning and design research. However, tacit assumptions of linear relationships between these factors have been embedded in most studies, leading to biased estimations of their effects on urban vitality. This study addresses the gap by using machine learning models and SHAP (SHapley Additive exPlanations) to investigate the non-linear and threshold effects of the built environment, road vehicles and air pollution on urban vitality, using Manhattan as a study case. Urban vitality was represented by pedestrian presence in 29,540 street-view images. Results showed that Extreme Gradient Boosting outperformed Ordinary Least Squares, Random Forest, and Gradient Boosting Decision Trees in urban vitality estimation. It reveals that while the built environment variables explained a significant portion (77.5 %) of the variance in urban vitality, road vehicles (such as bicycles, buses, cars and motorbikes) and ozone concentrations accounted for 15.18 % and 1.46 %, respectively. The built environment and road vehicle factors exhibit positive nonlinear relationships with urban vitality. Meanwhile, ozone concentration demonstrated a negative threshold effect on urban vitality with a threshold at 27.5 ppb. This study advances our understanding of the threshold effect mechanism of the factors on urban vitality, offering insights into fostering sustainable urban environment.

Keywords

Author Keywords

Urban vitalityStreet view imageNon-linear relationshipAir pollutionRoad vehiclesThe built environment

Keywords Plus

GOOGLE STREET VIEWPHYSICAL-ACTIVITYWALKING ACTIVITYJANE JACOBSBIG DATABARCELONATRANSPORTVIBRANCYSHENZHENFEATURES

Air Pollution

3-Efficacy of China's clean air actions to tackle $PM_{2.5}$ pollution between 2013 and 2020

By Geng, GN (Geng, Guannan) [1] ; Liu, YX (Liu, Yuxi) [2] , [3] ; Liu, Y (Liu, Yang) [1] ; Liu, SG (Liu, Shigan) [2] ; Cheng, J (Cheng, Jing) [2] ; Yan, L (Yan, Liu) [1] ; Wu, NN (Wu, Nana) [2] ; Hu, HW (Hu, Hanwen) [1] ; Tong, D (Tong, Dan) [2] ; Zheng, B (Zheng, Bo) [4] ; (provided by Clarivate) **Source NATURE GEOSCIENCE Volume 17 Issue 10 DOI 10.1038/s41561-024-01540-z Published OCT 2024 Early Access SEP 2024 Indexed 2024-09-25 Document Type Article**

Abstract

Beginning in 2013, China launched two phases (2013-2017 and 2018-2020) of clean air actions that have led to substantial reductions in PM2.5 concentrations. However, improvement in PM2.5 pollution was notably slowing down during Phase II. Here we quantify the efficacy and drivers of PM2.5 improvement and evaluate the associated cost during 2013-2020 using an integrated framework that combines an emission inventory model, a chemical transport model and detailed cost information. We found that national population-weighted mean PM2.5 concentrations decreased by 19.8 mu g m(-3) and 10.9 mu g m(-3) in the two phases, and the contribution of clean air policies in Phase II (2.3 mu g m(-3) yr(-1)) was considerably lower than that of Phase I (4.5 mu g m(-3) yr(-1)), after excluding the impacts from meteorological condition changes and COVID-19 lockdowns. Enhanced structure transitions and targeted volatile organic compounds and NH3 reduction measures have successfully reduced emissions in Phase II, but measures focusing on the end-of-pipe control were less effective after 2017. From 2013 to 2020, PM2.5 abatement became increasingly challenging, with the average cost of reducing one unit of PM2.5 concentration in Phase II twice that of Phase I. Our results suggest there is a need for strengthened, well-balanced, emission control strategies for multi-pollutants.

Keywords

Keywords Plus

ANTHROPOGENIC EMISSIONSPARTICULATE MATTERGLOBAL BURDENTRENDSOZONEINVENTORIESSIMULATIONPOLLUTANTSDISEASEQUALITY