

ENVIRONMENTAL

JUSTICE

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WHO'S MOVING FORWARD AND WHO'S BEING LEFT BEHIND?

ANCA BALIETTI & TOM ZEISING

In the United States, both racial and socioeconomic factors determine whether individual communities are left behind when it comes to environmental oversight. While progress has been made in reducing pollution levels over the past few decades, research conducted at the Alfred Weber Institute for Economics suggests that environmental injustice persists: U.S. firms are less likely to be inspected for compliance with environmental standards following increases in the non-White population in the communities where they operate – especially in states where Republican candidates consistently win major elections. As this article shows, moving forward will require a uniform and equitable approach to environmental regulation and enforcement.

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Human activity has brought about profound changes to the environment, reshaping ecosystems through climate change, pollution of air and water, and the loss of biodiversity. These impacts vary widely across the globe, even on small local scales, raising fundamental questions about equity and whether we all face similar levels of environmental damage. The short answer is no. While some people enjoy high environmental quality, such as clean air and water and limited effects of climate change, others bear the brunt of environmental degradation.

Air pollution is one of the most striking examples of these unequal exposures. Low-income communities and marginalized groups often live in areas with higher pollution levels, usually due to proximity to highways, factories, and other

sources of harmful emissions. The extent of these disparities has become increasingly evident through data from monitoring stations and high-resolution satellite images, revealing a greater risk of health problems such as asthma, heart disease, and other respiratory conditions in these communities.

In the United States, disparities in air pollution exposure are closely linked to race, with White populations generally experiencing cleaner air and lower pollution levels than non-White populations. Although this racial gap in pollution exposure has narrowed over the past few decades – thanks in large part to environmental regulations like the Clean Air Act – significant disparities persist. Many non-White communities are still disproportionately affected by higher levels of pollution.

Research at Heidelberg University further investigates these ongoing racial disparities in air pollution exposure. At the Alfred Weber Institute for Economics, we are looking into the role of governmental institutions in monitoring and ensuring that polluters comply with environmental regulations. By focusing on the United States – where environmental inequalities are often more severe, and data is more accessible than in the European Union – our research evaluates how effectively these institutions promote environmental justice and work to reduce the pollution gap. Our findings are not only important for understanding the situation in the U.S. but also provide

valuable insights for German policymakers seeking to address similar socio-economic challenges and achieve greater environmental fairness.

Environmental Auditing of Polluting Firms

Firms are significant contributors to air pollution, making them a primary target of regulatory efforts under the Clean Air Act in the United States. To address industrial emissions, the Environmental Protection Agency (EPA) is tasked with monitoring and regulating air pollution from individual companies. The EPA sets emission standards, conducts inspections, and enforces penalties for non-compliance to ensure that businesses adhere to federal air quality regulations. This oversight is vital for reducing harmful emissions from industries and mitigating the broader impact of corporate pollution on public health and the environment.

The EPA inspects firms based on two primary criteria: “for cause” and “neutral selection.” “For cause” inspections are initiated by specific triggers such as a company’s history of environmental violations, complaints from the public or employees, or facility characteristics that suggest a higher risk of environmental harm. These inspections are reactive, targeting entities that may pose significant environmental threats based on past behavior or specific indicators. In contrast, “neutral selection” inspections follow a more routine and proactive approach, scheduled based on factors

like the time elapsed since the last inspection or logistical considerations such as proximity to other facilities slated for inspection. This method ensures a systematic evaluation and consistent enforcement of environmental regulations across various industries and regions.

Although the EPA is established as an independent federal agency, its operations and priorities are influenced by political dynamics due to its organizational structure, which divides authority between federal headquarters and state-level offices. State environmental agencies play a critical role in the inspection and enforcement landscape, often possessing greater flexibility and responsiveness to local political and social contexts. This decentralized structure allows state offices to tailor inspection strategies to regional needs but can also introduce variations that reflect local political climates. Consequently, political considerations at the state level – such as shifts in local government priorities or demographic changes like an increase in the non-White population – can lead to disparities in inspection frequency.

This flexibility allows various factors to influence the EPA’s decisions on which firms to inspect. Although the agency aims to incorporate environmental justice into its inspection process by considering the vulnerability of nearby populations, other elements can also play a role. For instance, inspection probabilities can be influenced by political factors,

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such as the voting behavior and committee memberships of congressional representatives. Moreover, states with higher levels of corruption tend to have more relaxed environmental oversight. Community characteristics, including political activism, income, education, voter turnout, and environmental group membership, also affect the likelihood of inspections, particularly at the state level. This suggests that while the EPA strives for a systematic approach, inspection practices can be shaped by a range of social and political factors.

Our research at Heidelberg University investigates whether environmental auditing practices are flexible in response to changes in the racial composition of communities where polluters operate. Specifically, we examine whether firms continue to be inspected consistently as the U.S. population becomes increasingly non-White or if auditing practices shift with these demographic changes. We define a demographic shift as an increase of 0.05 percentage points or more over a period of two years. Our analysis aims to determine whether the enforcement of environmental regulations is equitable across different racial groups or influenced by evolving community demographics.

Reduced Inspections

Utilizing the EPA's open Enforcement and Compliance History Online (ECHO) database, our research examines state and federal environmental inspection data from approximately 250,000 environmentally important facilities across the contiguous United States, covering the period from 2000 to 2018. By analyzing this large dataset, we track changes in inspection patterns in relation to shifts in local demographics. Our findings reveal a clear pattern: firms are significantly less likely to be inspected after an increase in the non-White population in the areas where they operate. This effect is immediate and persists over several years, pointing to a sustained trend in how environmental oversight adjusts to demographic changes.

Environmental inspections are conducted by either the federal EPA or state agencies. Federal inspections are generally less frequent but tend to focus on major facilities with high pollution potential or a history of non-compliance, aiming to create a broad deterrent effect. In contrast, state agencies carry out more frequent inspections, targeting a wider range of facilities, including smaller operations and those dealing with local environmental concerns.

There are significant differences in how federal and state inspections respond to changes in racial demographics. Our analysis shows that this decrease in inspection frequency after an increase in the non-White population is observed mainly in state-level inspections. Federal inspections, however, remain largely unaffected by local demographic shifts.



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This difference could be explained by the fact that racial demographic changes may be more salient at the local level, where state inspectors are more likely to observe or respond to such shifts. Additionally, state-level inspections tend to be more routine and flexible, allowing greater discretion in selecting which facilities to inspect and how intensively. Moreover, literature suggests that White communities often exhibit a higher degree of neighborhood coordination, enabling them to more effectively complain and lobby for local-level regulatory attention and inspections. In contrast, federal inspections are stricter by design, focusing on high-polluting facilities where the stakes are higher and fewer inspections occur overall.

Interestingly, the pattern of changes in inspection rates after demographic shifts is strongest in Republican stronghold states – defined as states where Republican candidates consistently win major elections. In these states, both the increased salience of local demographic changes and the flexibility of state-level inspections may be amplified by political and institutional factors. In contrast, the effect is much more limited in Democratic stronghold states, where political priorities and regulatory frameworks may reduce the discretion state agencies have in responding to demographic shifts.

Impact on Environmental Quality

Effective inspections are critical for successful enforcement, as they provide the essential evidence needed to support legal actions against violators, carried out in conjunction with the judiciary system. Without regular and thorough inspections, violations may go undetected, allowing harmful practices to continue unchecked. To assess whether the reduction in inspection rates has indeed meaningful consequences for environmental quality, we analyze changes in air pollution concentrations following a racial demographic shift across both Republican and Democratic stronghold states. Given that the decline in inspection frequency is most pronounced in Republican states, we focus particular attention on these very areas, as the potential impact of reduced inspections is likely to be the greatest.

Our results show a significant increase in pollution levels in Republican stronghold states after the racial demographic jump, suggesting that the reduction in inspections may contribute to deteriorating air quality. We analyze various pollutants, including fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), sulfur dioxide (SO₂), and sulfate (SO₄), and observe a consistent upward trend across all of these pollutants in Republican states following the demographic shift. In contrast, we do not observe a similar increase in pollution levels in Democratic stronghold states, where inspection rates remain more stable after demographic changes.

WER KOMMT VORAN UND WER BLEIBT AUF DER STRECKE?

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Bei der Verringerung der Umweltverschmutzung gab es in den vergangenen Jahrzehnten erhebliche Fortschritte – dennoch bleibt Umweltgerechtigkeit eine ständige Herausforderung, da marginalisierte Bevölkerungsgruppen nach wie vor unverhältnismäßig von Umweltbelastungen betroffen sind. Die anhaltenden, auf ethnische und sozioökonomische Faktoren zurückzuführenden Ungleichheiten bei der Belastung durch Luftverschmutzung werfen Fragen nach der Effizienz und Gerechtigkeit der Prüfung von Umweltstandards auf.

Dieser Beitrag legt seinen Fokus auf die USA und zeigt, dass dort die Wahrscheinlichkeit, dass Unternehmen auf die Einhaltung von Umweltstandards überprüft werden, sinkt, wenn der Anteil der nicht weißen Bevölkerung in den Gemeinden, in denen sie tätig sind, steigt. Ein Rückgang bei der Anzahl der Inspektionen ist vor allem in Hochburgen der Republikaner zu beobachten und geht mit einer zunehmenden Umweltverschmutzung einher, was sowohl für die Umweltqualität als auch für die öffentliche Gesundheit ein erhebliches Risiko darstellt. Im Gegensatz dazu zeigen sich in den Hochburgen der Demokraten stabilere Inspektionsmuster, was dort dazu beiträgt, die Luftqualität zu erhalten und Gesundheitsrisiken zu verringern.

Diese Ergebnisse unterstreichen zum einen die Fortschritte bei der Umweltgesetzgebung, verdeutlichen aber auch, dass es immer noch Lücken bei deren Durchsetzung gibt, vor allem in Gemeinden, die von demographischem Wandel betroffen sind. Für weitere Fortschritte ist ein stärkeres institutionelles Engagement für eine einheitliche und gerechte Durchsetzung nötig, um sicherzustellen, dass alle Gemeinden, unabhängig von ethnischer Zusammensetzung oder politischem Kontext, von einem kontinuierlichen Schutz der Umwelt und der öffentlichen Gesundheit profitieren. ●

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„Um weiter voranzukommen, müssen Bundes- wie auch Landesbehörden ihr Engagement für eine einheitliche Durchsetzung intensivieren und sicherstellen, dass allen Gemeinden das gleiche Maß an Umweltschutz zuteil wird.“



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The increase in pollution in Republican states can lead to significant environmental and health risks. Pollutants such as $PM_{2.5}$ and NO_2 are linked to respiratory and cardiovascular diseases, while elevated ozone levels can worsen asthma and other lung conditions. Moreover, these pollutants can harm local ecosystems, and lead to long-term environmental degradation. These findings indicate that reduced inspection rates in Republican states may weaken enforcement of environmental regulations, leading to higher pollution levels and posing both environmental and public health risks. In contrast, the more stable inspection patterns in Democratic states appear to prevent similar increases in pollution, highlighting the role of political context in shaping the effectiveness of environmental oversight.

Progress and Persistent Challenges

Our research underscores both the progress made in environmental regulation and the persistent challenges that continue to undermine environmental justice in the United States. Significant strides have been made over the past few decades to reduce pollution levels nationwide, thanks largely to landmark regulations such as the Clean Air Act. These efforts have contributed to a narrowing of the racial gap in pollution exposure, reflecting forward movement in the quest for a cleaner, more equitable environment.

However, our findings reveal that the mechanisms of environmental enforcement remain unevenly applied, particularly in areas experiencing rapid racial demographic shifts. The downward adjustment in inspection rates following an increase in the non-White population demonstrates that racial disparities in regulatory enforcement persist, despite overall progress in reducing pollution. This gap is especially pronounced in Republican stronghold states, where reduced state-level inspections appear to contribute to increased pollution levels. In contrast, Democratic stronghold states show more consistent inspection practices, which helps ensure that environmental quality remains stable despite demographic changes.

These results highlight a critical area where institutions must improve: the alignment of environmental enforcement with principles of justice and equity. The flexibility of state-level inspections, while beneficial in some contexts, appears to leave room for the influence of political and demographic factors, resulting in unequal protection for marginalized communities. To move forward, it is essential for state and federal agencies to strengthen their commitment to uniform enforcement, ensuring that all communities – regardless of race or political context – receive the same level of environmental protection. ●