How Does Climate Change Challenge the Effectiveness of Environmental Policies? Evidence from Air Pollution in Canada

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Abstract:

This study examines the evolving dynamics between environmental policies and emerging climate-related challenges in Canadian air quality management. Although regulatory frameworks have effectively reduced anthropogenic air pollution across provinces, the accelerating climate change, which is measured in terms of wildfires in the study, presents significant counteracting effects. Employing extended STIRPAT model, we analyzed air pollution determinants across 10 Canadian provinces from 1995 to 2020, with particular attention to wildfire events and energy price fluctuations. Regression analyses demonstrate a significant negative correlation between environmental regulations and pollution levels ($p < 0.01$), while revealing strong positive correlations between wildfire occurrences and air pollution metrics ($R^2 = 0.92$). Our results indicate that traditional pollution control frameworks may require substantial modification to address climate-driven challenges. This research contributes to the growing body of literature on climate change adaptation in environmental policy, while demonstrating the utility of extended STIRPAT modeling for comprehensive environmental assessment.

Keywords:

Environmental Policy, Climate Change, Air Pollution, Canada, STIRPAT Model, Wildfire Impact