



## ENVIRONMENTAL REGULATIONS, AIR AND WATER POLLUTION, AND INFANT MORTALITY IN INDIA

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### Overview

The effectiveness of environmental regulation in developing countries is a critical issue both domestically and globally. Local air and water pollution in such countries is extremely high and has been shown to impose substantial health costs. Meanwhile, global climate change mitigation will rely heavily on domestic policy in developing nations.

India is a particularly important setting in which to examine the effectiveness of environmental regulation. Its large and rapidly growing population is already exposed to high levels of pollution. Its economy has grown more than six percent per year over the last two decades and will put increasing pressure on the environment. Moreover, it has a rich history of environmental regulation dating back to the early 1970s.

In this study, the authors evaluate the environmental and health impacts of three major Indian policies – two that target air pollution and originated with the Supreme Court of India, and one that targets water pollution and originated with the executive branch of government. Using detailed data on pollution and infant mortality, the authors statistically identify these regulations' effects five years after implementation. The findings indicate mixed regulatory success: the air pollution policies have had a significant, positive impact on ambient air quality but do not appear to have driven concomitant reductions in infant mortality; the water pollution policy has had no effect whatsoever. India's inconsistent success proves that, even in a country that places a high priority on economic growth, environmental regulation can be effective; however, it also underscores the importance of the details of policy design in achieving desired outcomes.

### Background

Foundational pollution legislation in India dates back to the passage of the Water Act and Air Act in 1974 and 1981, respectively. The Ministry of Environment and Forests was created in 1980 and is primarily responsible for setting overarching policy pertaining to the environment. Meanwhile, the Central Pollution Control Board and its state-level counterparts are responsible for data collection and policy enforcement. A third key entity in India's environmental regulatory landscape is the Supreme Court, whose reputation for environmental activism has been cultivated over decades of public interest litigation and judicial mandates directed at private industry and municipal governments alike.

The two air pollution policies examined by the authors are both mandates of the Supreme Court. One mandate required the development of action plans by specific cities to reduce air pollution generally. The other mandate

required catalytic converters to be fitted to the tailpipes of all gasoline-fueled cars in specific cities. Both policies were rolled out in phases, generally beginning in the mid-to-late 1990s with cities having both large populations and critical levels of pollution.

The water pollution policy under examination is the flagship river-cleanup initiative in India, known today as the National River Conservation Plan (NRCP). It began in 1985 under the name Ganga Action Plan, focusing exclusively on polluted locations along the Ganga River (India's largest). Since then, it has expanded in stages to cover 164 cities along 34 rivers. The focus of NRCP is domestic sources of water pollution, and the majority of regulatory expenses have been on sewage treatment infrastructure. Broad NRCP decisions are made by the executive branch of the central government, while implementation and enforcement are the joint responsibility of the Central and State Pollution Control Boards.

## Key Findings

1. **The two air pollution policies are associated with significant reductions in pollution.** Five years after their start date, the Supreme Court action plans are associated with a 38% average decline in nitrogen dioxide (NO<sub>2</sub>) relative to the baseline (1987-1990) levels. The catalytic converter mandates are associated with average drops of 19%, 69%, and 15% in particulate matter (PM), sulfur dioxide (SO<sub>2</sub>), and NO<sub>2</sub>, respectively, relative to baseline levels.
2. **The water pollution policy is not associated with any reductions in pollution.** Estimates of the impacts of NRCP on fecal coliforms (FCOLI), biochemical oxygen demand (BOD), and dissolved oxygen (DO) reveal no consistent relationships between the policy and water quality.
3. **The catalytic converter mandate is associated with a small reduction in infant mortality, but this reduction is not statistically significant.** This finding leaves open the question of how large the benefits of environmental policy actually are in this context, especially relative to the costs of implementation and compliance.

## Conclusions

There is a perception that environmental regulation in developing countries is challenging because regulatory institutions are generally weak and economic development is usually a higher priority than environmental quality. However, the finding that two major pollution policies in India have significantly improved air quality suggests that environmental regulations can be enforced successfully even in countries with relatively low levels of income and weak institutions. On the other hand, the fact that not every policy studied here has been successful indicates that factors affecting implementation and enforcement matter. In this particular study, the two policies that have worked were instigated by the judicial branch of government, while the policy emanating from the executive branch and requiring coordination between central and state bodies has largely failed.

**Full paper available at:** <http://heep.hks.harvard.edu/publications/environmental-regulations-air-and-water-pollution-and-infant-mortality-india>

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