

# Inducing Indian Plants to Abate Pollution



## In brief

- Gujarat has become an industrial powerhouse of India. However, this growth has been accompanied by air and water quality degradation.
- Holding industrial plants accountable for pollution is difficult in Gujarat, India, as the quality of information is unreliable and regulatory capacity is strained.
- The regulator, the Gujarat Pollution Control Board (GPCB), has not enforced strong sanctions as it does not trust the information from a new environmental audit system.
- This research attempts to study the effect of the new audit system on polluting plants.
- There are 3 main findings:
  - Plants in the treatment group reduced emissions relative to the control group
  - This reduction is concentrated in the water pollutants
  - The biggest polluters cut back on pollution far more than other firms.
- Therefore, the collection of accurate information can lead to outcomes that can improve environmental performance. When plants believe they will be held to account, they respect environmental regulation.
- The main policy implication is to change regulatory design to increase accountability, and thus, reduce pollution.
- Changes in regulatory design that would have a real impact include: increasing auditor independence from firms, broaden regulatory scrutiny and strengthen other channels for regulatory information.

## Motivation

*“Holding plants accountable for pollution is difficult when the quality of information on emissions is unreliable”*

High levels of industrial pollution are a harmful byproduct of growth. The Indian state of Gujarat is an industrial powerhouse with about 5 percent of the Indian population, but 9 percent of India’s registered manufacturing employment and 19 percent of output (Authors’ calculation, Annual Survey of Industries, 2004-05). This growth has been accompanied by a degradation of air and water quality. Eight industrial clusters are categorized as critically polluted, tied for the most of any state, and including the two most polluted in the country (Central Pollution Control Board, 2009b). Gujarat contains three of India’s five most polluted rivers and essentially all of the large cities in the state violate ambient air quality standards (Central Pollution Control Board, 2007; 2009a). Holding plants accountable for pollution is difficult when the quality of information on emissions is unreliable and regulatory capacity strained. The High Court of Gujarat introduced an environmental audit system for the state but this system, too, has been viewed as functioning poorly. The regulator, the Gujarat Pollution Control Board (GPCB), does not trust the information from this system enough to found strong sanctions on audits, to such an extent that polluting plants recently petitioned the Court, ironically and without success, to have the audit system ended on the grounds that the GPCB was not making use of the reports.

## Policy Impact

*“The regulator...does not trust the information from this system enough to found strong sanctions on audits”*

We study the response of polluting plants to the audit reform described in “Improving Third-Party Audits and Regulatory Compliance in India”. This reform was carried out in a sample of small and medium-sized plants (capital investments of less than USD 2.2m) with high pollution potential, as designated by GPCB based on their product and quantity of waste effluent. The average sample plant discharges 410,000 liters of waste effluent each day. About 90% of plants are from the textile sector, the largest manufacturing sector by employment in India. We report three main findings from independent measurements of plant pollution in the endline survey. First, plants in the treatment group reduced pollution emissions relative to the control group of plants. Second, this reduction is concentrated in the water pollutants that were the original policy rationale for the audit scheme. Third, the biggest polluters cut back on pollution far more than other firms. These results show that getting accurate information to the regulator can lead to improvements in real outcomes. They are immediately relevant for environmental regulation in India. Observers of environmental regulation in the developing world despair that inducing abatement is impossible with strained and unreliable regulators. This study shows this view is overly pessimistic---plants actually respect environmental regulation when they believe they can be held accountable to standards. Small changes in regulatory design can therefore increase accountability and reduce pollution.

## Audience

Water pollution has been a matter of intense public debate in India in the last ten years, prompting a number of large-scale demonstrations. Civil society groups such as the Centre for Science and Environment have often been at the forefront of conducting water quality tests and bringing the results to the public. Evidence that small, feasible changes in the regulatory framework can yield significant results may empower civil society and the public to demand better environmental protection. Environmental regulators in other states, such as Tamil Nadu and Maharashtra, have struggled with water pollution from chemical and textile plants and may be open to testing audit systems to hold plants accountable.

## Policy Implications

### Plants subject to independent audits reduced pollution

Plants under the reformed audit system reduced pollution as compared with plants under the standard system. The plant response is documented in Figure 1, which shows average measurements of several pollutants for plants under the modified and the standard audit systems. The pollution concentrations are substantially lower in the modified system (green bars) than in the standard system (blue bars).

### Water pollution is reduced more drastically than air pollution

We measured a larger plant response for water pollution than air pollution. The GPCB prioritizes water pollution control and is much more likely to punish firms for violations of water standards. For precisely this reason, audit reports in the old scheme were unlikely to report violations of these important pollutants. Firms responded to accurate reports on their water pollution emissions more strongly because these reports put them at greater risk of sanction.

### Pollution reduction is concentrated amongst the most polluting plants

Possible penalties for firms exceeding the regulatory standard include warnings, fines, plant closure and disconnection of water and electricity. The two most severe punishments, closure and utility disconnection, are meted out almost exclusively to firms that exceed the standards by the greatest degree. Getting accurate information to the regulator on the true level of pollution thus reduced pollution the most for the plants that were most polluting to start and therefore had the most to lose from full disclosure. In the absence of a strong enforcement regime, the weaker penalties had a small abatement effect.

*“The pollution concentrations are substantially lower in the modified system than in the standard system”*

## Implementation

### Increase auditor independence from firms

With properly aligned incentives (for details, see our other brief, “Improving Third-Party Audits and Regulatory Compliance in India”), auditors provide statistically accurate information on plant pollution levels. Firms respond by reducing pollution.

*“With properly aligned incentives, auditors provide statistically accurate information on plant pollution levels”*

### Broaden regulatory scrutiny

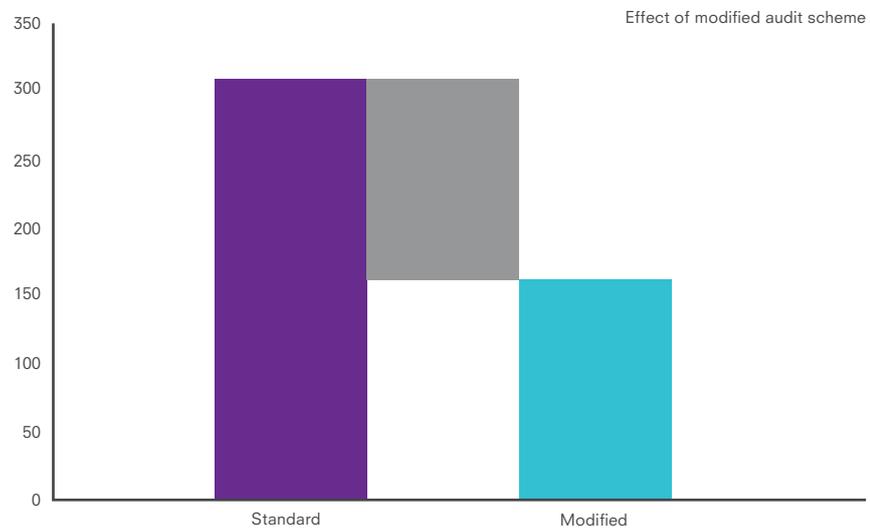
Plants that were clearly at risk of sanction for big violations of standards for important water pollutants, abated pollution the most by far in response to the audit intervention. Subject to constraints on regulatory enforcement capacity, this suggests that broader regulatory scrutiny, such as for particulate matter emissions, may also improve environmental quality.

### Strengthen other channels for regulatory information

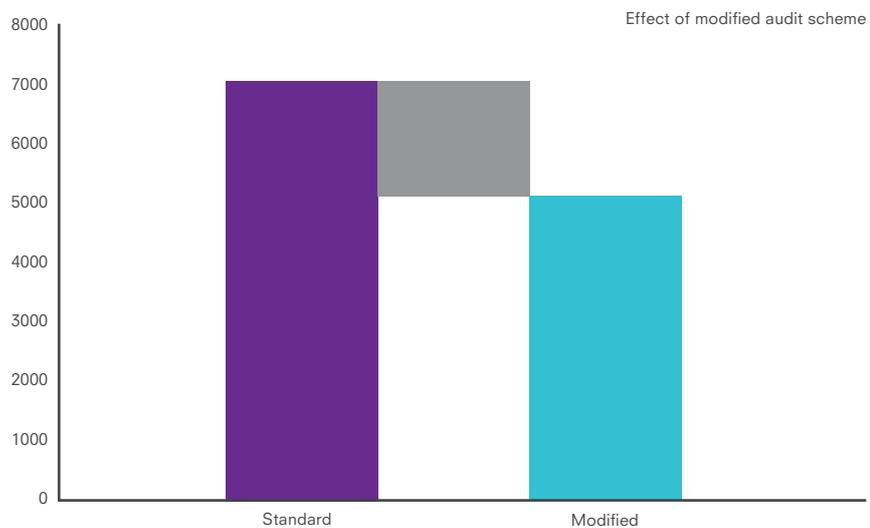
Consultants for Environmental Impact Assessments and the regulator’s own staff may also have incentives to underreport pollution. Independent verification of these reports, such as through overlapping monitoring regimes, may have similar effects as seen for environmental audits.

*“Plants that were clearly at risk of sanction for big violations of standards abated pollution the most by far in response to the audit intervention”*

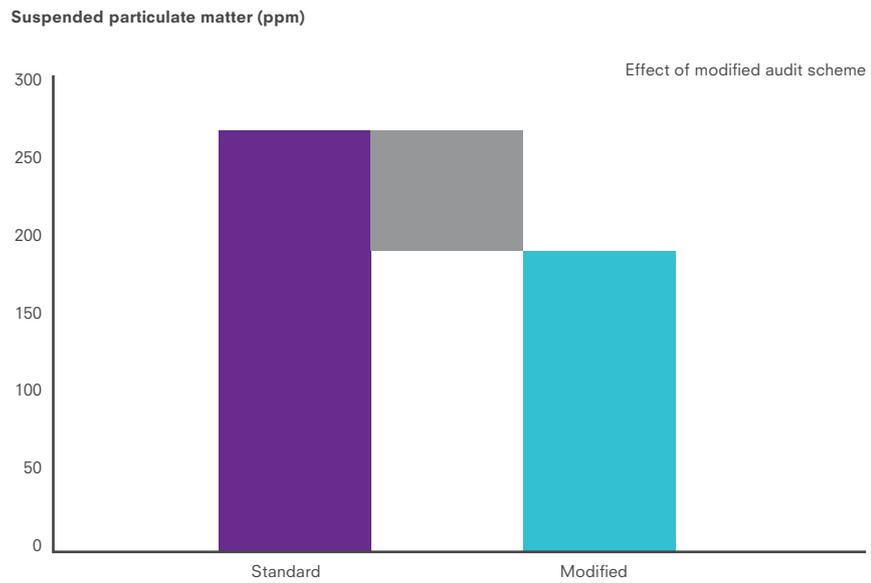
Biochemical oxygen



Total dissolved solids (mg/L)



*“Consultants for Environmental Impact Assessments and the regulator’s own staff may also have incentives to underreport pollution”*



## Dissemination

We are working with GPCB to make the modified audit system permanent. We are also exploring other systems for inducing firms to reduce pollution. An emissions trading system (ETS) is being tested in Gujarat in 2012 and 2013, which we expect will concentrate abatement in low-cost firms, reducing total costs. In other jurisdictions, ETS have been successful in drawing firms into the regulatory framework by offering the incentive of emission credits based on existing pollution to those that come forward. Since we suspect that there are a large number of firms with emissions above the regulatory standard who can reduce emissions relatively cheaply, this could be a large benefit.

## Further Readings

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## About the authors

*Esther Duflo* is a Professor of Poverty Alleviation and Development Economics at MIT. She is a co-founder and director of the Poverty Action Lab and a Research Associate at the National Bureau for Economic Research. Duflo specializes in development economics and the design and evaluation of effective anti-poverty policy.

*Michael Greenstone* is a Research Programme Director for the IGC's Energy Research Programme. He is the Milton Friedman Professor of Economics and Director of the interdisciplinary Energy Policy Institute at Chicago. His research estimates the costs and benefits of environmental quality and society's energy choices. He served as the Chief Economist for President Obama's Council of Economic Advisers from 2009/10.

*Rohini Pande* is Mohammed Kamal Professor of Public Policy at the Harvard Kennedy School of Government. Her research focuses on the economic analysis of the politics and consequences of different forms of redistribution, principally in developing countries. She has taught at Yale University, MIT and Columbia.

*Nicholas Ryan* is a Research Programme Director for the IGC Energy research programme. He studies energy markets and environmental regulation in developing countries. His research measures how energy use and pollution emissions respond to regulation and market incentives. Nick is joining Yale University as a Cowles Foundation Fellow for 2014-15 and an Assistant Professor of Economics from 2015 onwards.

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enquiries, please contact  
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International Growth Centre,  
London School of Economic  
and Political Science,  
Houghton Street,  
London WC2A 2AE



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