

China's pollution puts a dent in its economy

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The skyline of Shanghai, China

Although China has made substantial progress in cleaning up its air pollution, [a new MIT study](#) shows that the economic impact from ozone and particulates in its air has increased dramatically.

In recent decades, [China](#) has experienced unprecedented growth. But that growth comes with a steep price tag, according to the study, which appears in the February edition of the journal *Global Environmental Change*. The study, by researchers at the [MIT Joint Program on the Science and Policy of Global Change](#), analyzes the costs associated with health impacts from ozone and particulate matter, which can lead to respiratory and cardiovascular diseases.

Quantifying costs from both lost labor and the increased need for health care, the study finds that this [air pollution](#) cost the Chinese economy

\$112 billion in 2005. That's compared to \$22 billion in such damages in 1975.

“The results clearly indicate that ozone and particulate matter have substantially impacted the Chinese economy over the past 30 years,” even though there have been significant improvements in air quality detected over this period, says Noelle Selin, an assistant professor of engineering systems and atmospheric chemistry at MIT.

The researchers discovered this large economic impact because they looked at pollution's long-term effect on health, not just the immediate costs. In doing so, they found two main causes for the increase in pollution's costs: rapid urbanization in conjunction with population growth increased the number of people exposed to the pollution, and higher incomes raised the costs associated with lost productivity.

“This suggests that conventional, static methods that neglect the cumulative impact of pollution-caused welfare damage or other market distortions substantially underestimate pollution's health costs, particularly in fast-growing economies like China,” says Kyung-Min Nam, one of the study's authors and a postdoc in the Joint Program on the Science and Policy of Global Change.

Nam gives one example from the study showing that pollution led to a \$64 billion loss in gross domestic product in 1995. That compares to static estimates from the World Bank that found the loss to be only \$34 billion.

In this way, Selin says, “this study represents a more accurate picture than previous studies.”

Kelly Sims Gallagher, an associate professor of energy and environmental policy at Tufts University's Fletcher School, agrees: “This

important study confirms earlier estimates of major damages to the Chinese economy from air pollution, and in fact, finds that the damages are even greater than previously thought.”

The researchers calculated these long-term impacts using atmospheric modeling tools and comprehensive global economic modeling. These models proved especially important when it came to assessing the cumulative impact of ozone, which China has only recently begun to monitor. Using their models, the MIT researchers were able to simulate historical ozone levels.

China has become the world’s largest emitter of mercury, carbon dioxide and other pollutants. In the 1980s, China’s particulate-matter concentrations were at least 10 to 16 times higher than the World Health Organization’s annual guidelines. Even after significant improvements by 2005, the concentrations were still five times higher than what is considered safe. These high levels of pollution have led to 656,000 premature deaths in China each year from ailments caused by indoor and outdoor air pollution, according to World Health Organization estimates from 2007.

“The study is evidence that more stringent air-pollution control measures may be warranted in China,” Gallagher says — because of not just the health effects of pollution, but also the economic effects.

China is taking steps to respond to these health and economic concerns. In January, the nation set a target to limit its carbon intensity (the amount of carbon emitted per unit of gross domestic product) by 17 percent by 2015, compared with 2010 levels.

While the MIT study looked at the benefits of pollution-control measures on health in China, it did not calculate the costs of implementing such policies. That is work the Joint Program on the

Science and Policy of Global Change's new China Energy and Climate Project hopes to accomplish.

“We’re just getting started on an exciting program of work that will involve modeling the energy, environmental and economic impacts of climate and air-quality policies in China,” says Valerie Karplus, director of the China Energy and Climate Project. “The current study has provided initial insights and a strong foundation for this research going forward.”

The China Energy and Climate Project will analyze the impact of existing and proposed energy and climate policies in China on technology, energy use, the environment and economic welfare.

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