

Environmental regulations may have unintended consequences in energy production

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Many countries have passed environmental laws to preserve natural ecosystems. Although the regulations seem to have improved preservation efforts, they may have had unintended consequences in energy production, leading to more greenhouse gas emissions.

That's the conclusion of a new study by a researcher at Carnegie Mellon University that appears in the journal *PLOS ONE*.

"This study is the first to suggest that environmental regulations focused only on preserving ecosystems appear to have encouraged [electric utilities](#) to substitute dirtier fuels for hydropower in [electricity generation](#)," explains Edson Severnini, assistant professor of economics and [public policy](#) at Carnegie Mellon University's Heinz College, the study's author.

"According to our estimates, on average, each megawatt of fossil fuel power-generating capacity added to the grid because of environmental constraints on hydropower development led to an increase in annual carbon dioxide emissions of about 1,400 tons."

Severnini examined the tradeoff in the United States from 1998 to 2014 between efforts to preserve ecosystems and greenhouse gas emissions. In his work, he used a simple general equilibrium model for the electric industry. According to the model, consumers value electricity,

preservation of the ecosystem, and climate stability, but generating electricity damages the environment, through either construction of hydroelectric dams or greenhouse gas emissions, which contributes to climate change.

The study used two sources of data. The first is a 1990s report prepared for the U.S. Department of Energy to determine the undeveloped potential hydropower resources in the United States. The report contains information on locations and potential capacity of all such resources, which allowed the author to compute the potential hydropower that cannot be developed due to regulations intended to preserve the wilderness and wildlife.

The second source of data is the Environmental Protection Agency's Emissions and Generation Resource Integrated Database, which features environmental characteristics for most electric power produced in the United States.

In all, Severnini's sample included 110 counties in 33 states.

The study suggests that while environmental constraints on hydropower may have preserved the wilderness and wildlife by restricting the development of hydroelectric projects, the restrictions led to more greenhouse gas emissions. In many cases, environmental regulations replaced hydropower (a renewable, relatively low-emitting source of energy) with conventional fossil-fuel power (which is highly polluting).

"Do environmental regulations aimed at preserving [natural ecosystems](#) protect the environment?" Severnini asks. "The answer seems to be not necessarily. The findings of my study highlight the pernicious incentives of [environmental regulations](#) that are focused on only one type of power plant—in this case, hydroelectric dams—and points to the importance of an integrated regulatory framework that considers both ecosystem

preservation and [greenhouse gas emissions](#)."

More information: Edson Severnini et al, The unintended impact of ecosystem preservation on greenhouse gas emissions: Evidence from environmental constraints on hydropower development in the United States, *PLOS ONE* (2019). [DOI: 10.1371/journal.pone.0210483](https://doi.org/10.1371/journal.pone.0210483)

Provided by Carnegie Mellon University

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