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WIND, SOLAR FARMS COULD BRING RAINS TO SAHARA DESERT

Relevant for: Indian Economy | Topic: Infrastructure: Energy incl. Renewable & Non-renewable

Camels drink water in the Sahara desert around 100 kilometers from the town of Zouerat, Mauritania, | Photo Credit: AP

A massive wind and solar installation in the Sahara Desert would increase precipitation and vegetation in the world's largest hot desert.

The study, published in the journal *Science*, is among the first to model the climate effects of wind and solar installations while taking into account how vegetation responds to changes in heat and precipitation.

“Previous modeling studies have shown that large-scale wind and solar farms can produce significant climate change at continental scales,” said Yan Li, a postdoctoral researcher at the University of Illinois in the US. “But the lack of vegetation feedbacks could make the modelled climate impacts very different from their actual behaviour.”

“We chose it [Sahara] because it is the largest desert in the world; it is sparsely inhabited; it is highly sensitive to land changes; and it is in Africa and close to Europe and the Middle East, all of which have large and growing energy demands,” he said.

The wind and solar farms simulated in the study would cover more than nine million square kilometers and generate, on average, about three terawatts and 79 terawatts of electrical power, respectively. “In 2017, the global energy demand was only 18 terawatts, so this is obviously much more energy than is currently needed worldwide,” Li said.

The model revealed that wind farms caused regional warming of near-surface air temperature, with greater changes in minimum temperatures than maximum temperatures. “The greater nighttime warming takes place because wind turbines can enhance the vertical mixing and bring down warmer air from above,” researchers said. Precipitation also increased as much as 0.25 millimetres per day on average in regions with wind farm installations.

“This was a doubling of precipitation over that seen in the control experiments,” Li said. In the neighbouring Sahel, average rainfall increased 1.12 millimetres per day where wind farms were present. “This increase in precipitation, in turn, leads to an increase in vegetation cover, creating a positive feedback loop,” Li said.

Solar farms had a similar positive effect on temperature and precipitation, the team found. Unlike the wind farms, the solar arrays had very little effect on wind speed.

“We found that the large-scale installation of solar and wind farms can bring more rainfall and promote vegetation growth in these regions,” said Eugenia Kalnay, from University of Maryland in the US. “The rainfall increase is a consequence of complex land-atmosphere interactions that occur because solar panels and wind turbines create rougher and darker land surfaces.”

“The increase in rainfall and vegetation, combined with clean electricity as a result of solar and wind energy, could help agriculture, economic development and social well-being in the Sahara, Sahel, Middle East and other nearby regions,” said Safa Motesharrei from University of

Maryland.

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