# Irrigating Australia's deserts won't increase rainfall, new modeling shows

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Credit: AI-generated image (disclaimer)

,For generations, Australians have been fascinated with the idea of turning our inland deserts green with lush vegetation.

Both sides of politics have supported proposals to irrigate the country's center by turning northern rivers inland. Proponents have argued water

lost to evaporation would rise through the atmosphere and fall back as rain, spreading the benefits throughout the desert. But this claim has hardly ever been tested.

Our recently published research shows irrigating Australia's deserts would not increase rainfall, contrary to a century of claims otherwise.

This provides a new argument against irrigating Australia's deserts, in addition to critiques on economic and environmental grounds.

## The Bradfield scheme

Proposals to irrigate the country's center by diverting water inland date back to at least the 1930s. The person most widely credited with the idea is John Bradfield, the civil engineer who designed the Sydney Harbour Bridge. He proposed a series of dams and tunnels that would transport water from northern Queensland to Kati Thanda-Lake Eyre.

Variants of the original scheme have been proposed as recently as 2020. The Queensland Liberal National Party campaigned on a policy to build a Bradfield-like scheme in the last state election.

Despite our fascination with it, the Bradfield scheme has well-documented problems. It is not cost-effective and would likely be a disaster for the environment. These findings have been confirmed repeatedly by multiple reviews, as recently as 2022.

Yet the idea resurfaces over and over again and the debate around it remains active and ongoing.

Crossbencher Bob Katter, the federal member for Kennedy in Queensland, is a prominent supporter of the scheme. He rejected the critical findings of a recent CSIRO review that found the scheme and

others like it were not economically viable.

## Would it increase rainfall?

Would the Bradfield scheme increase rainfall in central Australia? Given all the debate about the scheme, this question has received surprisingly little attention.

Bradfield argued the added irrigation water would effectively double or triple the region's rainfall:

"This irrigation water would augment the average rainfall of the district from 10 to 20 inches per annum […] Skeptics and croakers say the water will evaporate or seep away […] [but] it will not go far."

To test Bradfield's claim, we turned to climate models. In a collaboration between scientists at the University of Melbourne, Harvard University, National Taiwan University and the Australian Bureau of Meteorology, we simulated two worlds: one with a Bradfield-like scheme and one without it.

In our model of the Bradfield-like scheme, we permanently filled the region around Kati Thanda-Lake Eyre with water. That differs a bit from Bradfield's original scheme but captures the basic idea. If anything, it is more extreme than Bradfield's scheme. If Bradfield is right, we would expect our scheme's effects on rainfall to be even larger.

Our simulations showed no significant increase in rainfall. This may sound surprising but can be explained with basic physical arguments.

### Why no rain?

Rain forms when moist air rises. As it rises, temperatures drop, water

condenses from vapor to liquid and clouds form.

Hot air rises, so high temperatures near the surface can promote rainfall. But in our simulations, irrigating the surface led to evaporative cooling of the air. The colder air did not rise as much, and rainfall was suppressed.

Where does all that extra water go? In our simulations, the water evaporated and was blown all over the Australian continent by wind. The additional water ended up being spread thinly over a large area. When it did eventually rain out, the effect on local rainfall was tiny.

Climate models aren't perfect and have known weaknesses in simulating rainfall. But the basic explanation for the small change in rainfall can be understood without appealing to climate models.

Could irrigating a larger region, or a different part of the country, change the results? Maybe, and we are looking into it. But the Bradfield scheme is already not cost effective. Making the scheme larger or moving it away from natural flow paths would only make this problem worse.

Previous reviews of the Bradfield scheme have mainly focused on the economics of the scheme. Australian economist Ross Garnaut's report in December 2022 is the most recent to find the scheme is economically unviable.

Our study provides a new argument against the Bradfield scheme, separate to economic arguments.

The idea of transforming our dry continent is seductive. But our study shows no plausible engineering scheme would be capable of making it rain enough to do so.

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