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Irrigation Adjustment to Ethanol Expansion in Reservoirs

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Editorial

Because of Renewable fuel schemes, global ethanol output has exploded. Water resources have become a source of concern as a result of land conversion and crop displacement caused by ethanol feedstock production. We investigate agricultural producer's irrigation decisions in the Kansas portion of the High Plains Aquifer in response to local ethanol market expansion in this research. To see how ethanol expansion affects irrigation decisions, we looked at field-level data on irrigation water use, irrigated acreage, and crop decisions for approximately 23,000 fields in Kansas from 2003 to 2017. We examine how the introduction and expansion of an ethanol plant affects three irrigation decisions

• Irrigated acreage

• Irrigation per acre

• Total water use

We discovered that as the ethanol market grew, so did irrigation water use. Within 50 kilometres, a 10% increase in ethanol production increases yearly water demand by 0.22 percent per field (4.8 acre-inches per field). In 2017, we estimate that ethanol markets accounted for around 4% of overall irrigated water use. For a variety of reasons, it's critical to understand how ethanol plant site and capacity affect irrigation water use. For starters, understanding the local effects on groundwater pumping might be used to create predictions about locations prone to localised drawdown and to design programmes to mitigate drawdown. Second, knowing how irrigation affects groundwater depletion is crucial for understanding the unexpected consequences of government bioenergy policies on socially valuable groundwater reserves. It is critical to provide this information in order to shape laws so that future bioenergy policies and ethanol production do not conflict with water conservation efforts. We discovered that as the ethanol market grew, so did irrigation water use. Increases in local (0.50KM) ethanol capacity of 10 million gallons per year increase annual water demand by 1.03 acre-ft per field. In the case of maize, we discovered that increasing local ethanol capacity by 10 million gallons per year increases irrigated acreage by 0.31 acres per field. This translates to 0.017 elasticity, meaning that a 10% increase in ethanol capacity corresponds to a 0.17 percent increase in irrigated corn acreage. Finally, we estimate that ethanol markets accounted for around 4% of overall agricultural pumping from the Kansas HPA in 2017. Our findings show that the development of the ethanol industry exacerbates the already challenging problem of regulating groundwater reserves in the HPA.

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We estimate that around 4% of agricultural water usage over the HPA in 2017 was due to local ethanol markets, based on the expected increase in water demand due to ethanol divided by observed yearly water use. The estimated cumulative impact on irrigated acreage is lower, with a 95 percent confidence interval that overlaps zero. These findings shed light on the potential consequences of expanded biofuel production in the future. The ethanol sector has advocated for greater usage of E15, which has been certified for use in most cars by the Environmental Protection Agency. Increased demand for ethanol under a 15% fuel blend could further encourage corn acreage and irrigation water consumption.

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