BRC Science Highlight
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Water Impacts of U.S. Biofuels: Insights from an Assessment Combining Economic and Biophysical Models

Background/objective

Biofuels policies differ in the extent and mix of feedstocks they induce for biofuel production and, therefore, in their impact on water resources. We quantify and compare the spatially varying water impacts of biofuel crops stemming from the land use change induced by two different biofuels policies: a Biofuel Mandate (Mandate) and a Clean Fuel Standard (CFS).

Approach

- A process-based crop-water model, CropWatR, is coupled with an economic model, BEPAM, to simulate the economically viable mix of crops, land uses, and crop management choices under a Mandate and a CFS designed to achieve the same reduction in economy-wide greenhouse gas emissions.

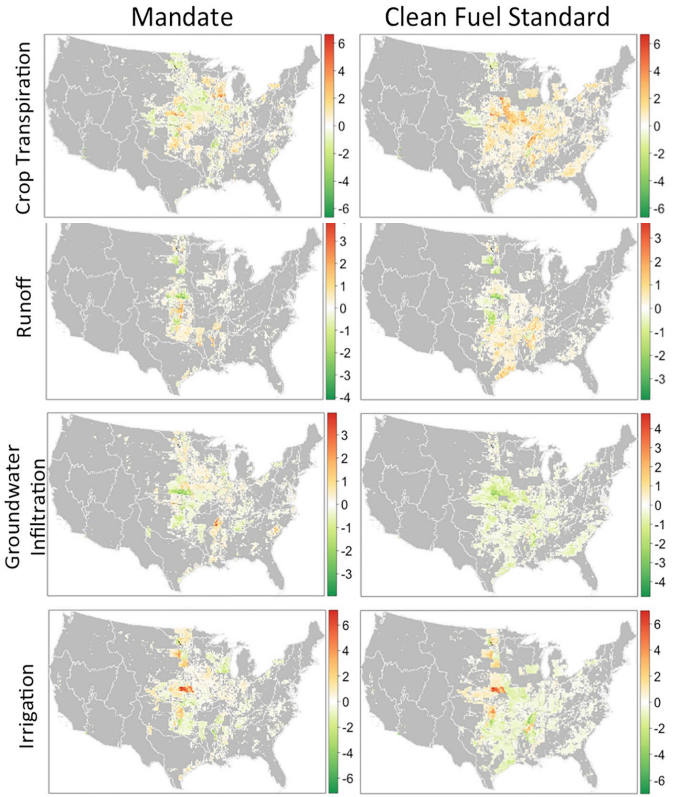
Results

As compared to a Mandate, a CFS leads to:

- Much greater incentives to produce cellulosic biofuels from energy crops and a larger displacement of conventional crops from cropland.
- Larger conversion of marginal land to energy crop production.
- Larger evapotranspiration and runoff but lower groundwater infiltration and lower irrigation needs.

Significance

- Policies promoting advanced biofuels from rainfed energy crops and reducing demand for corn ethanol decrease overall demand for irrigation but can lead to increased evapotranspiration and runoff as more marginal land is brought into production.



Differences, in billions of liters, in agricultural water balances in the Mandate scenario and Clean Fuel Standard scenario relative to the no-policy counterfactual.

*Teter et al., 2018. "**Water impacts of U.S. biofuels: Insights from an assessment combining economic and biophysical models**." PLOS ONE 13(9): e0204298. https://doi.org/10.1371/journal.pone.0204298*

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U.S. DEPARTMENT OF ENERGY