The Hydrologic Implications of Large Scale Biofuel Production

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With increasing awareness of the geopolitical and environmental consequences of contemporary fossil fuel consumption there is a growing urgency to identify and develop viable alternatives that will support national and international energy requirements. Among the liquid fuel alternatives, the use of ethanol fermentation and diesel extraction from agricultural and silvicultural feedstocks has received the most attention. Current US production of biofuel is relatively small (~2% of national liquid fuel demand) but rapidly growing, and policies are in place to increase the contribution of biofuel dramatically in the coming decades. The production of feedstocks is not without environmental consequences: water is a key input to the process, while nitrogen, sediment and organic pollution are well known consequences of agricultural production and processing. In this work, we examine the implications of large scale biofuels on national and regional environmental systems, with an emphasis on comparisons of water use and pollutant load among various feedstocks relevant to the Southeastern US. Using a net energy framework (i.e., gross energy yield minus energy required for production) we compute hydrologic and water quality metrics for large scale biofuel production, and we discuss these metrics in light of the status, trends and regulatory mandates for national and regional water resources.

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