**The Missing Piece: Estimating Unreported Irrigation for Sustainable Water Management**

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Irrigation remains the predominant consumptive use of water within the United States, accounting for 62% of total consumption. This significant reliance on irrigation underscores the necessity for accurate water management strategies, which are currently based on user-reported data. However, discrepancies in reporting and exemptions for small-scale withdrawals pose challenges in accurately assessing water use and its impacts on water supply. This study sheds light on the considerable volume of irrigation water that goes unaccounted for in existing regulatory frameworks. Leveraging USDA census data, the USDA Irrigation and Water Management Survey (IWMS), and meteorological data, a method was developed to estimate irrigation water withdrawals in South Carolina, spanning the years 2002 to 2022. A distinctive feature of this methodology lies in its capacity to distinguish between unreported withdrawals from small and large farms. This enables a detailed spatial analysis of counties where cumulative withdrawals from small farms are significant yet traditionally underrepresented in water management and planning. It offers a necessary framework for accurately assessing irrigation withdrawals, which is crucial for the practical management of water used for supplemental irrigation. Our findings underscore the importance of incorporating both reported and unreported data into developing irrigation water management plans and permits. This study reaffirms the necessity of addressing the critical issue of underreported water use in agricultural planning and policy formulation, thereby facilitating a more informed and sustainable approach to water resource management across diverse agricultural landscapes.