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Implications of optimal groundwater extraction for sustainable groundwater use in Indian semi-arid tropical watershed

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ABSTRACT

The paper studies groundwater use under optimal and farmer's myopic groundwater extraction scenarios using a simple optimal control framework in semi arid watersh[illegible] of Gujarat. Implications of this extraction pattern have been examined on the state of groundwater in terms of life of wells. The optimal control solution suggested a three times increase in well life, with an increase of two times in volume of groundwater extracted, increasing thereby, the net present value of benefits from well irrigation by 2.3 times under optimal extraction regime over the existing myopic regime of profit maximization. Sensitivity analysis done for varying potential recharge scenario suggested that these results are stable and marginally increase with higher potential recharge. An optimal extraction with desired change in cropping system and groundwater allocation based on marginal value of water has been suggested as the panacea for falling groundwater table.