

Cumulative influence of small reservoirs on downstream flows in a semi-arid catchment: Merguellil, central Tunisia

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Abstract Despite small reservoirs becoming increasingly widespread across many semi-arid regions, their cumulative influence in large catchments remains poorly understood. Part of the difficulty lies in distinguishing their effect over concurrent human and climatic processes which also affect runoff. In the Merguellil catchment, in semi-arid central Tunisia, detailed analysis of 114 events revealed a 45% decrease in the runoff coefficients of rainfall events under 40 mm occurring on similar conditions of land cover and soil humidity, following the development of reservoirs and contour benches. These are capable of reducing annual flows by 25–30%. However the major decrease in catchment runoff observed after their construction is shown to be largely related to climatic fluctuations. Annual runoff variations were weakly correlated with total rainfall, but driven by changes in the number of rainfall events over 15 mm (5–6 per year) and in their circumstances, notably rainfall intensity, crop cover and antecedent soil moisture.

Key words small reservoirs; water harvesting; runoff coefficients; rainfall events; climate influence; semi-arid zones