

Groundwater Recharge in Semi-Arid Basins

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Abstract

Groundwater recharge in semi-arid basins depends strongly on the timing of rainfall relative to soil saturation, not merely on total annual rainfall. This report presents recharge estimates for the Kavango Basin derived from a network of 14 monitoring boreholes over a three-year period, and finds that recharge is dominated by a small number of high-intensity storm events rather than by cumulative seasonal rainfall.

1 Introduction

Conventional recharge estimates in semi-arid regions often assume a roughly linear relationship between seasonal rainfall total and aquifer recharge. Borehole data from the Kavango Basin, collected over three wet seasons (2023–2026), suggests this assumption breaks down once rainfall is disaggregated by storm intensity rather than treated as a seasonal total.

2 Method

Water-table depth was logged hourly at 14 boreholes distributed across the basin’s three principal soil types (sandy loam, clay-rich floodplain, and shallow laterite). Recharge events were identified as water-table rises exceeding the borehole’s measurement noise floor within a 48-hour window following rainfall, and attributed to the specific storm event whose timing matched the rise.