

Wetland inundation and moisture dynamics in Tugwi-Zibagwe and Shashe sub-catchments, Zimbabwe: insights from 2017 to 2023

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ABSTRACT

We analysed the Modified Normalized Difference Water Index (MNDWI) from Sentinel-2 Level 1 C and the Topographic Wetness Index (TWI) from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) digital elevation model (DEM). Total inundated wetland area dropped by 0.1% in the Tugwi-Zibagwe and by 0.2% in the Shashe between 2017 and 2023. Significant correlations between temperature and rainfall impacts were observed in the Shashe sub-catchment ($r = -0.84$; $p = .02$ and $r = 0.77$; $p = .04$), whereas in Tugwi-Zibagwe, these correlations were less pronounced ($r = -0.60$; $p = .15$ and $r = 0.39$; $p = .39$). Between 2017 and 2023, large and small seasonal wetlands fluctuated between 60.2% and 35.9% of the total wetland area in Shashe whilst in Tugwi-Zibagwe it varied from 17.4% to 14.9%. The findings underscore the critical importance of conserving and restoring small (<1 ha) unprotected wetlands in rural semi-arid regions.