

Reservoir Capacity Assessment through Remote Sensing Technique – A Case Study of Terna Reservoir, Maharashtra, India

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Abstract

Reservoirs play a crucial role in supplying water for domestic, irrigation, and industrial purposes. Over time, sediment carried from catchment areas accumulates in reservoirs, reducing storage capacity and water quality, which impacts effective reservoir management. Regular assessment of reservoir capacity is essential to assess updated water balance in the reservoir. The present study focuses on the Terna Reservoir, located on the Terna River in Dharashiv district, with the objective of updating its elevation–area–capacity curve and assessing the loss of live storage due to sedimentation. Historical and recent surveys were analyzed to quantify capacity changes over time. Sentinel-2A and Sentinel-2B geo-referenced satellite data with 10 m resolution were used for the latest survey, analyzing eight images representing water levels between MDDL 639.780 m and FRL 644.200 m during 2022–2025. Remote sensing techniques provides a rapid, economical, and reliable method to estimate current reservoir capacity. Results indicate a significant reduction in storage over the decades. The original survey in 1967 recorded a live storage of 23.372 Mm³. By 1987, it had decreased to 19.663 Mm³, showing a long-term declining trend. The latest survey (2022–2025), compared to 1987, revealed a present live storage of 18.014 Mm³, indicating a loss of 1.649 Mm³ (8.386%) over 37 years (1987–2024), or an average annual loss of 0.226%. These findings highlight the on-going impact of sedimentation on reservoir performance and emphasize the need for regular capacity assessments to ensure sustainable water management and long-term operational efficiency.

Keywords

Reservoir, Capacity assessment, SRS Survey, Sedimentation, Satellite images.