Assessment of sedimentation in Tuli – Makwe Dam using remotely sensed data

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Abstract

A remote sensing approach was used to assess sedimentation in Tuli-Makwe Dam in the semi-arid Mzingwane Catchment in the Matebeleland South province of Zimbabwe. The loss in reservoir gross capacity due to sediment deposition for a period of 47 years since the construction of the dam in 1966 to 2013 was determined to be 3.371 Mm3 which translate to 40.84 % gross capacity loss. The revised capacity of the dam is estimated at 4.883 Mm3. The annual rate of sedimentation was calculated to be 0.87 % per annum which translates to 0.0717 Mm3 per annum. The specific sediment yield over Tuli- Makwe catchment was calculated to be 110.63 tonnes / km2 / year. The result of the sedimentation analysis is typical of small reservoirs in semi-arid regions in Southern Africa. The sedimentation results for Tuli-Makwe reservoir using the remote sensing approach for 2013 are comparable with the sedimentation results from the 2012 hydrographic survey. The results further confirm the applicability of remote sensing for sedimentation analysis for small reservoirs in semi-arid regions. Assuming a uniform sedimentation rate, current trends suggest that Tuli-Makwe reservoir may be filled up in the next sixty eight years from 2013, however the useful capacity of the reservoir may be lost in much less time.