

Numerical Simulation of Kangimi Reservoir Sedimentation, Kaduna State, Nigeria

Authors : Abdurrasheed Sa'id, Abubakar Isma'il, Waheed Alayande

Abstract : This study focused on carrying out numerical simulations of Kangimi reservoir sedimentation by reviewing different numerical sediment transport models, and GSTARS3 was selected. The model was developed using the 1977 data. It was calibrated by simulating the 2012 profile and sediment deposition and compared with 2012 hydrographic survey results of NWRI. The model was validated by simulating the 2016 deposition and compared the results with NWRI estimates. Also, the performance of the proposed model was tested using statistical parameters such as MSE (Mean Square Error), MAPE (Mean Average Percentage Error) and R2 (Coefficient of determination) with values of 1.32m, 0.17% and 0.914 respectively which shows strong agreement. After the calibration, validation and performance testing the model was used to simulate the 2032 and 2062 profiles and deposition. The results showed that by 2032 the reservoir will be silted by 25.34MCM or 43.3% of the design capacity and 60.7% of the capacity by the year 2062. A number of sedimentation mitigation measures were recommended.

Keywords : NWRI- national water resources institute, sedimentation, GSTARS3, model

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