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Geographic Information Systems and Remotely Sensed Data for the Hydrological Modelling of Mazowe Dam

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Abstract : Unavailability of adequate hydro-meteorological data has always limited the analysis and understanding of hydrological behaviour of several dam catchments including Mazowe Dam in Zimbabwe. The problem of insufficient data for Mazowe Dam catchment analysis was solved by extracting catchment characteristics and aerial hydro-meteorological data from ASTER, LANDSAT, Shuttle Radar Topographic Mission SRTM remote sensing (RS) images using ILWIS, ArcGIS and ERDAS Imagine geographic information systems (GIS) software. Available observed hydrological as well as meteorological data complemented the use of the remotely sensed information. Ground truth land cover was mapped using a Garmin Etrex global positioning system (GPS) system. This information was then used to validate land cover classification detail that was obtained from remote sensing images. A bathymetry survey was conducted using a SONAR system connected to GPS. Hydrological modelling using the HBV model was then performed to simulate the hydrological process of the catchment in an effort to verify the reliability of the derived parameters. The model output shows a high Nash-Sutcliffe Coefficient that is close to 1 indicating that the parameters derived from remote sensing and GIS can be applied with confidence in the analysis of Mazowe Dam catchment.

Keywords : geographic information systems, hydrological modelling, remote sensing, water resources management
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