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Pitman Rainfall-Runoff Modelling of Ungauged Catchments in Madagascar.

The Pitman rainfall-runoff model (whose modern version is also known by the acronym WRSM2000) was used for predictions in virtually ungauged catchments in Madagascar for the assessment of water availability for a Rio Tinto Iron and Titanium mine. The model is widely used in South Africa. It was used for the most recent country wide water resources assessment for the whole of South Africa, Lesotho and Swaziland (WR2005 Study using data up to 2005) and a current study is underway to update data, add new information and recalibrate up to 2010. The Pitman model works on a monthly time step and can be set up to simulate the flow of water through any number of sub-catchments. Its modern version, the WRSM2000 model, takes into account all the impacts of catchment developments in the form of afforestation, irrigation, alien vegetation, wetlands, dam construction, urbanisation of the land surface, mining and abstractions and return flows. The model is of modular construction in which the five types of sub-model (runoff, channel, reservoir, irrigation and mine) are linked via a network of flow routes. Historical flows are simulated and then compared with the gauged streamflow records. Depending on the closeness of fit of statistical and graphical output, the parameters will either be accepted or adjusted (calibrated). Although there were good, long rainfall records in the relevant catchments in Madagascar, there were only three years of observed streamflow at two locations, therefore it was virtually ungauged. Calibration parameters for the Pitman model were therefore “transferred” from a similar coastal catchment in South Africa on a similar line of latitude. The relevant catchment characteristics in Madagascar were added including the much higher mean annual precipitation values. After some minor fine tuning of the calibration parameters, a reasonably good fit was obtained between the observed and model simulated parameters. Following this, the analysis of water availability for the mine was assessed. The poster shows a map showing the relevant catchments in both countries, the Pitman system schematic diagram, graphical plots and statistical comparisons. Relevant information pertaining to this and other studies using the Pitman model has also been included.