

Effect of rainfall variability on surface water resources: A case study from semi-arid Zimbabwe

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About 75% of the communal lands in Zimbabwe is in Natural regions IV and V that are semi-arid. They receive less than 600 mm of rainfall per annum with frequent droughts. The rainfall is also erratic, poorly distributed and falls predominantly for only a few months each year resulting in livelihood insecurity. Good crop yields are received 3 out of 5 years forcing the communities to rely on stored underground water or water stored in dams. Unlike groundwater, surface water, especially from the small dams responds to droughts because of high evaporation rates and seepage therefore are not a buffer against droughts.

There are about 600 small to medium dams in Masvingo that have been built by the government and NGOs in order to provide water resources to the communal areas. The capacity of these small dams range from 60000 to 3000000 metres cubed while their catchment areas also vary from 2 km squared to 55 km squared thereby requiring between 30 mm and 55 mm respectively to fill them up when they are empty. The amount of rainfall required to fill these dams depend on their initial level at the beginning of the rainy season.

This paper examines the effect of historical rainfall on runoff and possible dam water changes in some of the dams in the Runde catchment that is 41000 kilometres squared in the semi-arid Zimbabwe. The temporal variability in both rainfall and runoff are considered from 1914 and 1960 respectively.

The mean rainfall was 550 and 591 and a standard deviation of 202 and 253 at Chivi and Chendebevu rainfall stations that are 80 km apart in the Runde catchment. Annual rainfall was above and below average half the times at Chivi station. Mean annual runoff was 88 50 and 54 mm with a standard deviations of 125, 55 and 55 mm for the sub-catchment that are 23000, 17100 and 5930 kilometres squared in area respectively. Of the 34 years when runoff was measured, there was an insignificant decline in runoff from 1962 to 1997 for two of these catchments while one of them shows an insignificant increase in runoff with time. The corresponding rainfall data shows an insignificant decline from 1914 to 1997. There is a significant relationship between rainfall and runoff for all the sub-catchments that was more than 0.65.

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