

River Research and Applications

The fate of the City of Mutare's urban water supply as changing climate impacts on its source in the Pungwe sub-catchment

Anesu D. Gumbo ¹, Evison Kapangaziwiri ²

¹Department of Geography and Environmental Science, University of Venda, Thohoyandou, Limpopo, South Africa

²Hydrosciences, Council for Scientific and Industrial Research (CSIR), Water Centre, Pretoria, South Africa

<https://onlinelibrary.wiley.com/doi/10.1002/rra.3883>

Abstract

Sustaining a steady supply of water to urban communities is of importance in a period that is characterised by rapid urban population growth, a global pandemic, and a changing climate that threatens the availability of the resource from its sources. Water supply to the City of Mutare is from three sources, Small Bridge Dam, Odzani, and the Pungwe River. The Pungwe source provides better quality water resources equivalent to the combined quantity supplied by the other two. It becomes an important source for the city, but climate change threatens the availability of water resources in the southern African region. Thus, it is imperative to quantitatively assess the impacts of a changing climate on water resources to enable the development of sustainable management alternatives. Using two carbon emission scenarios Representative Concentration Pathways (RCPs) 4.5 and 8.5, the study assesses the future availability of water resources from the Pungwe River to the City of Mutare using the Pitman hydrological model applied in an uncertainty framework. Available historical streamflow observations at gauging station F14 indicate a Q95 flow of about 2 Mm³/year. Projected future water resources at the end of the 21st century show a slight increase of up to 2.38% under the low carbon emission scenario (RCP4.5) and a decrease of up to 9.73% under the high carbon emission scenario (RCP8.5). These model-generated results are useful to water managers to plan for catchment management strategies that would ensure continuous urban water supply, and the identification and development of possible future alternative water sources.