

Repeated failure of borehole supplies in weathered Precambrian basement throughout southern Africa, and in Malawi in particular, has been blamed on a variety of causes. These include poor borehole design, badly sited boreholes, mechanical failure and even implementer ignorance of basic hydrogeological principles. Recent work in Malawi demonstrates that recharge and flow potential of the data-scarce basement aquifer can be investigated by deriving a variety of surrogate and secondary data.

Investigation shows that the weathered Precambrian basement aquifer may not always be up to the job sustaining even modest abstraction sources indefinitely and that many new sources will fail in the short to medium term. Failure is the result of recharge being able to sustain abstraction within the limited capture zone of an abstraction source, there being little effective lateral inflow of groundwater on the African plateau savannah lands which have very low hydraulic gradients. If lateral groundwater flow does occur across source capture zone, for example towards the rift-valley escarpment, sources are more sustainable to a degree, depending on the volume of through-flow. Where surface water courses traverse the aquifer, albeit flowing ephemerally or largely as sub-river bed sand rivers, sustainability of borehole sources is increased provided there is hydraulic connectivity to the aquifer. Abstraction from the aquifer within a source capture zone may be as little as 25% of storage in isolated rural areas, more typically about 50% and as high as 70% in the more densely populated areas. If demographic growth requires an increase of just 1% in large areas of Malawi, source failure will occur within a 25-year to 35-year period.