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Management of groundwater sustainability and contamination - a Mozambique case study

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Groundwater is vulnerable to contamination from natural and anthropogenic activities. The agricultural and human activities associated with hydrological characteristics influence the quality of groundwater. The City of Tete is in the Nharthanda Valley (Zambezi River, Central Mozambique). The city faces a set of serious structural issues of access to water such as a precarious public water supply system, including a lack of network management, water rationing, and a poor sewerage system. Groundwater is collected from the aquifer for the public water supply system of the old city of Tete and a for a traditional agro-livestock farm, which is irrigated by artesian wells. Groundwater abstraction has increased in the last few decades, and it was identified as a risk for groundwater quality and quantity. Groundwater physico-chemical and microbiological parameters obtained from fifteen boreholes and eleven wells have been determined to assess water quality. The presence of potential contaminant activities throughout the Nharthanda Valley and adjacent areas associated with contamination of the Zambezi River contribute to the degradation of water quality. The high vulnerability index for most chemical and microbiological elements indicates that groundwater is easily reached by bacteria and viruses and other potentially toxic substances. Most of the water parameters, from wells and boreholes, exceed the water referenced values allowed for human consumption and agricultural use. The protection of the Nharthanda Valley aquifer system is necessary and urgent. The identification of the most vulnerable areas provides important information for groundwater management, such as the indication of protection measures in aquifer systems.