

## Abstract

The number of boreholes for abstracting water from aquifers beneath Nairobi City increased from 2 in the year 1927 to about 2500 in the year 2009. According to the Republic of Kenya Population and Housing Census, the urban population of Nairobi City increased from 29,864 in 1928 to 3,138,295 in 2009. Substantial groundwater drawdown has been noted in individual boreholes that supply the growing population in some localities. The purpose of this study was to investigate the variation in water rest levels across Nairobi City during the 80 year period and estimate the surface settlement that can result from groundwater exploitation. The groundwater static level variations in space and time were analysed on Surfer 9 software and the average rest levels in boreholes between 1927 and 2009 were calculated. Using the hydrogeological data obtained from drilling, an estimate of ground settlement that could result from continuous drawdown was made from formulae obtained from past studies done elsewhere. The results indicate that the groundwater rest levels have dropped with an average of 79 m in the last 80 years and a probable settlement of 0.34 m to 5.9 m could result from groundwater depletion from aquifers and clay aquitards over a long period of time. Between the ground surface and the clay aquitards are the dense Nairobi Phonolite and/or Nairobi Trachyte. The probable settlement of 5.9 m should serve as a wakeup call to put up measures that can mitigate subsidence and the related consequences in Nairobi City. Indeed, 67% of the drop in rest levels has occurred in the last two decades during which more than 1000 additional wells have been drilled.