

ABSTRACT

This study sought to investigate water supply in the Juja area and in turn discovered prevalent cases of poor water supply and inadequate and unreliable water distribution systems offered by the Local Authorities. This has in turn resulted to people finding alternative sources of water for domestic purposes. The most common alternative is the shallow hand dug well, but on studying the water quality of the wells, it highlighted the high levels of pollution and contamination of the well waters rendering them harmful for domestic use.

This in turn lead to the design and fabrication of an effective and reliable filter unit that can adequately treat the well water and render it harmless for domestic use. The filter was made using locally available materials, that is, sand and quarry dust as alternative means of water purification. These materials were arranged in a PVC column and used to filter the water. The raw water was treated with the sand and quarry dust media and the effluents tested for turbidity, E

coli, Total Dissolved Solids, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand

(BOD5), Ph and nitrate and ultimately compared with the influent results which were also analysed

using the aforementioned parameters. Raw water was treated under three different runs all spaced

within a set time period so as to effectively determine the efficiency of the unit as the biofilm ripened

with time. Data was then analysed using correlation analysis and represented in tables and graphs

The set up achieved the best results in the third run which was done two and a half weeks after assembling of the filter unit. This was done to provide ample time for the ripening and growth of the biofilm that was important for the treatment process. It proved to be quite efficient the removal of colour, Total dissolved solids and Escherichia coli with efficiency levels of 83.3%, 78.4%, and 98.4% respectively. The E-coli levels, however as much as they attained a high degree of removal, failed to meet the WHO Standards. Turbidity removal efficiency by the column unit was relatively average an efficiency of 46.2% attained and was poor in the removal of nitrates (22.2%). The set up was however ineffective in the removal of organic pollutants. It can be seen from the obtained results that sand and quarry dust can be effectively used to purify well water. The set up can be improved through the provided recommendations to further improve its efficiency.