

Impacts of Non-revenue water loss on water quality, quantity and the environment Teresa Onyango

Rongo

University

terylonyango

@yahoo.com

Abstract

Non-revenue water loss is a global problem faced by water utilities around the world and despite the

measures and strategies that have been put in place. These efforts are usually centered towards ensuring that water utilities are able to maximize their profits and therefore the water that is lost is usually compensated by extracting and distributing more water to meet the demand and generate more revenue while overlooking the negative ecological footprints caused during the process of water distribution. These environmental impacts however can sometimes be subtle and thus may be difficult to ascertain and quantify. Data was gathered through purposive sampling of 26 Key informants Interview, 16 discussants in a Focused Group Discussion, Chemical analysis of water from KIWASCO's main water treatment plant and observations by the researcher. The data was then subjected to the descriptive analysis and presented in frequency tables and figures. The findings of the study indicated that majority of the respondents (78.57%) believed water quality was significantly affected by pipe bursts/leakages while 16.67% and 4.76% argued for illegal water consumption and accounting errors respectively. Similarly, the FGD participants also agreed that pipe burst/leakages has significant negative impacts on water quality. They stated that whenever a pipe burst occurs, the pressure with which that water is running will determine how many foreign particles will be washed away and infiltrated in the distribution channels. An analysis in the change of water quality parameters also indicated there was a significant positive correlation between pipe bursts/leakages and water quality components ($p\text{-value} > 0.05$ and $\rho=0.872$). The findings also indicated that from May through October 2019 KIWASCO lost approximately 158,500 cm³ representing a 31.17% water loss which is 6.17% higher than the Kenyan Water Services Regulatory Board's recommended levels of 25%. An environmental risk analysis done to evaluate the significance of the impacts using the Failure Modes Effects Analysis (FMEA) indicated that NRW loss significantly affect water quality including pollution at source, water quantity, air pollution, destruction of water catchment, water shortage, adverse health implications, water logging, soil erosion and sedimentation. Aesthetic value, effects on downstream communities and loss of biodiversity on the other hand were found to not be significantly affected.

Keywords: Non-Revenue water, environmental impact, water quality, water quantity