ENHANCING WATER QUALITY OF CITY CANALS THROUGH SEWAGE TREATMENT PLANT FOR SUSTAINABLE IRRIGATION: A CASE STUDY IN KURUNEGALA CITY

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Abstract: In Kurunegala city, a vital link between agriculture and water has long been established through the utilization of water diverted from the Wilgoda anicut for irrigation by paddy farmers. These farmers have informally relied on a combination of wastewater mixed with irrigation water during the wet season (WS) and wastewater alone during the dry season (DS), a practice that inadvertently exposed farmers to health risks. This study sought to assess the impact of the Sewage Treatment Plant (STP) on water quality of irrigation water suitable for agriculture, ultimately promoting food security. Composite water samples were collected from 5 sampling sites along the canals downstream to STP during the DS and WS for physicochemical and microbiological analysis. The study utilized a general linear model to analyze the spatial and temporal fluctuations in water parameters. The STP's impact on enhancing water quality was assessed by employing the Water Quality Index (WQI). The water quality in the canals of Kurunegala city demonstrated significant spatial and temporal variations ($P<0.05$). In 2005 (pre-STP), the WQI (35.2), signified poor water quality and the current WQI stands at 49.4, denoting a marginal enhancement in water quality ($P<0.05$). Post-STP scenario depicted that water temperature, salinity, nitrate, electrical conductivity (EC), pH, total suspended solids (TSS), biological oxygen demand (BOD), and dissolved oxygen (DO) in canals are improved for irrigation compared to pre-STP data. The WS exhibited elevated levels of EC, TSS, and DO in conjunction with increased values of *E. coli*, while the dry season was characterized by heightened salinity, pH, temperature, TDS, BOD_5 and chemical oxygen demand. This study highlighted the transformative potential of STPs in improving water quality and ensuring a consistent and safe water supply for irrigation. Therefore, the successful implementation of STPs in cities holds the potential to increase the water quality of polluted tank cascade systems in Sri Lanka.

Keywords: Food security; Irrigation systems; Sustainable agriculture; Wastewater treatment; Water quality