Reducing Pressure on Aquifers: Examining Rainwater Use as an Alternative in Denim Wet Processing in Narayanganj, Bangladesh

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Abstract

Bangladesh's economy heavily relies on its textile industry, contributing a substantial 83.4% to the nation's export revenue. Within this sector, wet processes consume significant amounts of water, often leading to a heavy dependence on easily accessible groundwater. However, this reliance poses a threat to local communities' access to safe potable water, particularly in Narayanganj, located to the southeast of Dhaka, where numerous textile factories are located. The excessive use of groundwater has caused a rapid decline in the water table, amounting to a 1 to 2 meter drop annually. This study aims to explore the feasibility of using rainwater as an alternative water source for textile wet processes in Narayanganj, where the yearly average rainfall reaches 2,047 mm and meets the necessary water quality standards for textile processing. The research emphasizes integrating rainwater with groundwater for these processes, aligning with Sustainable Development Goals (SDGs) 6, 9, and 12. Denim fabrics underwent dyeing and washing procedures using harvested rainwater, after which the samples underwent evaluation through tests for color fastness during washing and rubbing (under both dry and wet conditions). The obtained results, falling within the 4-5 Grade range, unequivocally affirm the viability and efficiency of rainwater harvesting as a water resource for textile wet processing in denim manufacturing. This confirms the effectiveness of rainwater harvesting for textile processing, potentially meeting 40-60% of the industry's water demands. Embracing this alternative source can ease pressure on groundwater reserves and offer a sustainable solution to address their depletion. These findings are expected to benefit inhabitants of Greater Dhaka, water management authorities, and register a positive impact on the environment.

Keywords: Bangladesh; denim; textile; groundwater; rainwater; sustainable development