

RESEARCH PAPER:

Studies on suitability of under ground water for irrigation as influenced by effluents flowing in Khari canal around area of Nawagam-Vatava region of Gujarat (India)

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SUMMARY

A study was conducted to determine the suitability of under ground water for irrigation as influenced by effluents flowing in Khari canal around area of Nawagam-Vatava region of Gujarat (India). Twenty - twenty samples of tube well were collected from both contaminated and uncontaminated locations where effluent canal is passed. The samples were analyzed for irrigation quality parameters, micronutrient and heavy metal contents. The pH of tube well water of uncontaminated area was in the range of 7.10 to 9.36, neutral to alkline while tube well water of contaminated area was highly acidic (pH 6.40) to alkaline (pH 8.56) in reaction. The EC of the ground water of non-contaminated area was comparatively less saline than contaminated area. Among different cation and anion concentrations of Na⁺, Cl⁻, CO₃²⁻ and HCO₃⁻ ions were 73, 30, 73 and 46 per cent higher in tube well water sample of contaminated area as compared to uncontaminated area. While K⁺ and Ca²⁺ + Mg²⁺ were higher in tube well water of uncontaminated area as compared to contaminated area. The sodium absorption ratio and residual sodium bicarbonate were also calculated. The SAR (18.0) and RSC (4.5) values were also higher in tube well water from contaminated area than their corresponding values in well water of uncontaminated area. This indicated that the quality of ground water in contaminated area was inferior to that of non-contaminated area. The water soluble and total micronutrients (Fe, Mn, Zn and Cu) and heavy metals (Cd, Ni, Cr, Pb and Co) were comparatively higher in tube well water of contaminated area except water soluble Fe, which was higher in tube well water of uncontaminated area. This indicated that the ground water contamination was laterally extended below ground even up to about 1.5 to 2.0 km away from the open channel carrying mix industrial effluents into Khari river.

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The main source of irrigation in Nawagam area is open well, bore well and village ponds. The village ponds are receiving effluent water through Khari canal/channel, which carries industrial effluents discharged from the industrial area of Naroda and Vatva. These effluents may or may not be biodegradable. It was also observed that there were approximately 1600 units of which, about 525 units generate effluents. These units include dyes intermediates, process house, chemical industries, pigment manufacturers etc., which discharge chromium as one of the metals in their effluents. Therefore, there are possibilities of the contamination of surface and ground water and soils of the area by heavy metals present in the wastewater released by the industry. Farmers in Nawagam area use effluent diluted with fresh canal water for irrigation purpose as and when required. The

wastewater contains beneficial elements such as N, P, K, S etc. as well as toxic metals such as Cd, Pb, Ni, Cr, Co etc. In our country, most of the wastewater is a mixture of domestic, commercial and industrial activities. Therefore, although a large proportion of this wastewater is organic in nature and contains essential nutrients but in many cases toxic elements too are present in appreciable amounts (Kansal, 1994; Venkateswara Rao *et al.*, 1996; Srinivasachari, *et al.*, 1998; Siddaramaiah *et al.*, 1998; Patel *et al.*, 2003 and Maliwal *et al.*, 2005).

MATERIALS AND METHODS

The twenty-twenty tube well water samples were collected in the clean plastic bottle from uncontaminated areas like Shrijipura (2), Chitrasar (2), Dharoda (2), Kathwada (1), Chalindra (1), Bareja (2), Bherai

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