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**Research Article**

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# Fluctuation in quality of underground wells/tube wells water with time in Dev Bhumi Dwarka district of Gujarat

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## Summary

To study the fluctuation in quality of irrigation water, thirty representative underground well/ tube well water samples were collected from each taluka of Dev Bhumi Dwarka district *viz.*, Kalyanpur, Dwarka, Khambhalia and Bhanvad during before monsoon (May, 2015) and at the same site during after monsoon (November, 2015). The mean EC (dS $m^{-1}$), pH, SAR, RSC and SSP values were 2.00, 7.67, 5.34, 0.45 and 52.01 before monsoon and changed to 1.79, 7.88, 4.23, 0.26 and 43.16 after monsoon with per cent improvement of 10.50, -2.74, 20.79, 42.22 and 17.02, respectively. The quality indices of irrigation water like EC, SAR, RSC and SSP of the irrigation decreased and improved, while that of pH value increased after monsoon as compared to that observed before monsoon.

**Key words :** Fluctuation in quality of irrigation water, Wells/ tube wells water quality

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## Introduction

Irrigation is a key factor that boots agricultural production. In arid and semi-arid region of India, availability of water for irrigation has been always a constraint in crop production. The concentration and composition of dissolved constituents in water determines its quality for irrigation. The quality of irrigation water is an important consideration in any appraisal of salinity and alkali condition in an irrigated area for obtained a sustainable crop yield. Soil salinity, an inherent soil property in coastal region mainly depends upon the salinity of ground water, the potential source of salts, which gradually rises up and evaporates on the soil surface during dry period (Bandyopadhyay, 1972). Notably salinity and its allied characteristics in the soil and ground water fluctuate with season (Annual Report CSSRI, 1977), vary appreciably in space and eventually affects the plant growth. Such information was lacking in newly formed Dev Bhumi Dwarka districts of Saurashtra region of Gujarat. Therefore, the present investigation was planned to study the fluctuation in quality of irrigation water with time in wells/ tube wells waters.

## Resource and Research Methods

Thirty representative underground well/tube well water samples were collected for two times at same site from each talukas of Dev Bhumi Dwarka district *viz.*, Kalyanpur, Dwarka, Khambhalia and Bhanvad in

the month of May, 2015 (before monsoon) and in the month of November, 2015 (after monsoon) at an interval of six month (Fig. A). Total two hundred forty well/tube well water samples were collected during two season by using standard procedure. Running wells/tubes well were selected randomly for collection of water samples during May, 2015 (before monsoon) and from same site after six month water samples were collected during November, 2015 (after monsoon). Each selected well/ tube well was run for half an hours and then the samples were collected in thoroughly cleaned plastic bottles, properly labeled and brought to the laboratory for further chemical analysis using standard procedures as outlined by Richards (1954).

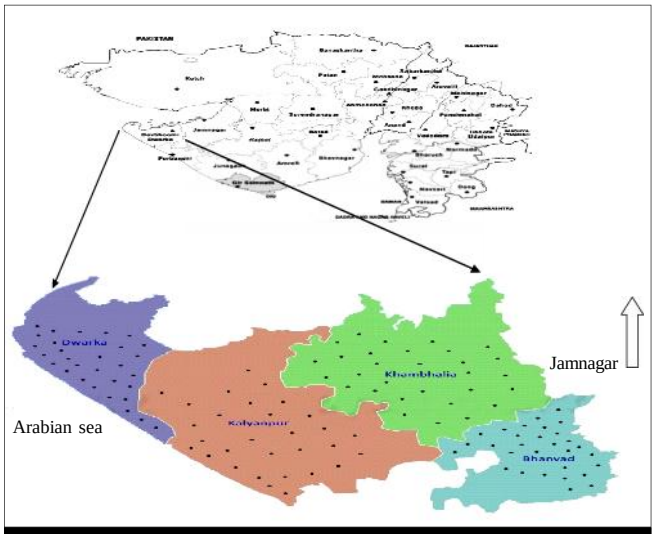


**Fig. A : Water sampling site of Dev Bhumi Dwarka district**

## Research Findings and Discussion

Fluctuation in quality of underground wells/tube wells water with time were calculated from the mean data of various water quality indices of before monsoon (May, 2015) and after monsoon (November, 2015) and are presented in Table 1. The overall EC values of irrigation water before and after monsoon were 2.00 and 1.79 dS $m^{-1}$, respectively. The maximum (10.77 %) and minimum (8.61 %) improvement in EC values of irrigation water were found under Bhanvad and Dwarka talukas, respectively. This clearly indicate that the water quality in terms of types and amount of salts presents in it improved to the tune of 10.50 per cent. The overall pH values of irrigation water before and after monsoon were 7.67 and 7.88, respectively, including an increase of pH value to the tune of 2.74 per cent. The maximum (2.99 %) increased in the pH values of irrigation water of Dwarka and the minimum (2.20 %) in Bhanvad, taluka. This increase in pH value of water sample after monsoon might be due to increase in proportion of alkaline salts as compared to neutral salts. Before monsoon the SAR, RSC and SSP values were 5.34, 0.45 and 52.01, while it was 4.23, 0.26 and 43.16 indicating the improvement of water quality indices of irrigation water to the tune of 20.79, 42.22 and 17.02 per cent, respectively. The maximum improvement of SAR (25.25 %) of irrigation water found after monsoon under Kalyanpur taluka, RSC (45.21 %) of irrigation water was found after monsoon under Dwarka taluka and SSP (24.79 %) under Bhanvad taluka. The improvement in quality indices of irrigation water after monsoon as compared to that found before monsoon is expected because of dilution effect of recharge of underground water due to rainfall and rise of water table during July to September, similarly, Bharambe *et al*. (1992) reported that ground water table rose during rainy season (July-August) in Jayakwadi command area and average water table depth decreased from 2.60 to 1.78 m during rainy season, remained almost constant during winter and subsequently increased in EC, pH and SAR values during rainy and winter season and increased considerably during summer season. The results obtained in the present investigation is in direct line those reported by Kabaria (2004); Bharambe *et al*.

**Table 1: Fluctuation in quality indices of well/tube well water with time**

| Name of taluka | EC (dS $m^{-1}$) | | | pH | | | SAR | | | RSC (me $L^{-1}$) | | | SSP | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BM | AM | % change | BM | AM | % change | BM | AM | % change | BM | AM | % change | BM | AM | % change |
| Kalyanpur | 2.60 | 2.36 | 9.23 | 7.64 | 7.81 | -2.23 | 6.02 | 4.50 | 25.25 | 0.47 | 0.35 | 25.53 | 53.99 | 42.30 | 21.65 |
| Dwarka | 2.09 | 1.91 | 8.61 | 7.68 | 7.91 | -2.99 | 6.32 | 5.32 | 15.82 | 0.73 | 0.40 | 45.21 | 54.89 | 48.40 | 11.82 |
| Khambhalia | 2.04 | 1.85 | 9.31 | 7.65 | 7.86 | -2.75 | 5.68 | 4.72 | 19.90 | 0.22 | 0.13 | 40.91 | 54.17 | 48.20 | 11.02 |
| Bhanvad | 1.30 | 1.16 | 10.77 | 7.74 | 7.91 | -2.20 | 3.32 | 2.50 | 24.24 | 0.53 | 0.39 | 26.42 | 43.81 | 32.95 | 24.79 |
| Overall | 2.00 | 1.79 | 10.50 | 7.67 | 7.88 | -2.74 | 5.34 | 4.23 | 20.79 | 0.45 | 0.26 | 42.22 | 52.01 | 43.16 | 17.02 |

Where, BM= Before monsoon (May, 2015), AM=After monsoon (November, 2015)

(1992); Bharambe *et al*. (2001); Patil *et al*. (2014); Das and Maji (2001) and Polara and Chauhan (2016).

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