

Determination Of Fluoride Concentrations In Ground Water In Two Different Seasons In Two Years(2015&2016) In Lingapalem Mandal

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Abstract: It is a known fact that more than 20 developed and developing countries including India where 19 states are facing acute fluorosis problems. Various technologies are being used to remove fluoride from water. But, still the problem has not been rooted out. The previous study reveals that, excessive fluoride concentrations are reported in ground water in Lingapalem mandal. This paper focuses on the fluoride concentrations in Lingapalem mandal, west Godavari district, AP. The West Godavari district is one of the 13 districts of Andhra Pradesh. West Godavari occupies an area of approximately 7700 square kilo meters. It has 46 Mandals out of which 24 are in Upland Region. Study area comprises 19 panchayats in Lingapalem Mandal. Seasonal variations of fluoride concentrations and their Mean values and the spatial distribution of fluoride concentrations in Lingapalem mandal in two seasons in two consecutive years 2015 & 2016 are studied at 19 different places and their graphical representation in the form of contours. The fluoride concentrations are varied for each season due to the irregular rainfall, Geological formation, Lithology. Anthropogenic sources might also have affected the fluoride concentrations in that area.

Keywords: Fluoride; Fluorosis ; Ground water; Spatial Distribution ; Lingapalem mandal

I. Introduction

Fluoride is a common, natural and 13th most abundant element on earth's crust. It is found naturally in soil, water, food and several minerals like fluor spar, rock phosphate, cryolite. It occurs naturally in public water systems as a result of runoff from weathering of fluoride-containing rocks and soils and leaching from soil into groundwater. Atmospheric deposition of fluoride-containing emissions from coal-fired power plants and other industrial sources also contributes to amounts found in water, either by direct deposition or by deposition to soil and subsequent runoff into water. Its average composition on earth's crust is around 0.06-0.09%. Concentration in sea water is 1.3 ppm, while in fresh water supplies the natural range is between 0.01-0.3. Certain amount of fluoride is required in drinking water which is useful in reducing tooth decay and protects teeth from decay by demineralization and re-mineralization. Children need fluoride to protect their permanent teeth as they are being formed but excessive levels of fluoride can produce dental fluorosis, lowers IQ and also causes skeletal fluorosis that damages to bones and joints.

According to WHO, millions of people around the world are exposed to excessively high levels of fluoride through drinking water that is contaminated from natural geological sources. WHO estimates that 2.7 million people in China have the crippling form of the disease.

II. Study Area

The West Godavari district is one of the 13 districts of Andhrapradesh. It occupies an area of approximately 7700 square kilometers. It has 46 Mandals out of which 24 are in Upland Region. Study area comprises 19 panchayats in Lingapalem Mandal. It lies between 16.88031 to 16.98490 Latitude and 81.02160 to 81.0090 Longitude. Geomorphologically the district can be divided into two major regions viz., alluvial deltaic region and upland areas (Figure 1). The deltaic region mostly constitutes black cotton soils and the upland areas are dominated by the red soils.

III. Water Sampling

In present investigation, 19 water samples from Lingapalem mandal were collected. The water samples were collected in polythene bottles which were cleaned with acid water and hot water followed by rinsing twice with distilled water. The water samples were analyzed by using standard protocols.



Figure 1: Location of mandals in westgodavari district.

IV. Objective

To identify fluoride concentrations in Lingapalem Mandal in the west Godavari district. To Suggest scientific strategies for providing safe drinking water , improved water quality management and drinking water resource sustainability

V. Methodology

Fluoride concentrations in water sample was determined by using ion selectivity meter Eutech ion - 2700. In olden days fluoride concentrations were determined by using **spadans** reagent spectrophotometrically.

VI. Results And Discussions

Table 1: GPS details of Lingapalem Mandal.

S.No	Sample Code	Village Name	GPS Details	Elevation (Ft)
			Latitude & Longitude (Degrees)	
01.	11:1:1S	Badrala	16.91881,81.10940	249
02.	11:2:1S	Asannagudem	16.94918,81.10885	306
03.	11:3:1S	Vemulapalli	16.94841,81.09776	284
04.	11:4:1S	Ramanujapuram	16.94141,81.08135	307
05.	11:5:1S	Rangapuram	16.94610,81.06880	321
06.	11:6:1S	Puppalarigudem	16.96805,81.07428	355
07.	11:6:2S	Puppalarigudem	16.96261,81.08046	329
08.	11:7:1S	K Gokavaram	16.97551,81.06646	348
09.	11:8:1D	Kottapalli	16.96401,81.03815	347
10.	11:9:1D	Singagudem	16.94891,81.00905	305
11.	11:10:1S	Lingapalem	16.94910,80.99711	450
12.	11:11:1S	Yadavalli	16.96541,80.95268	154
13.	11:12:1S	T Ch R Palem	16.93653,80.97413	290
14.	11:13:1S	Mattanagudem	16.92635,81.01081	236

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15.	11:14:1S	Dharamajigudem	16.89441,81.00426	245
16.	11:15:1S	Mulagalampadu	16.93493,81.05908	354
17.	11:16:1S	Rayannapalem	16.92943,81.05366	363
18.	11:17:1S	Kalaranigudem	16.88741,81.02756	276
19.	11:18:1S	Ayyaparajigudem	16.88031,81.02160	228

Table 2: Fluoride concentrations in pre and post monsoon in two consecutive years 2015&2016.

S.NO	SAMPLE CODE	PRE MONSOON 2015	POST MOSOON 2015	PRE MONSOON 2016	POST MONSOON 2016
01.	11:1:1S	0.137	0.433	0.361	0.287
02.	11:2:1S	0.581	0.647	0.389	0.214
03.	11:3:1S	0.722	1.34	0.970	1.07
04.	11:4:1S	0.314	0.877	0.525	0.752
05.	11:5:1S	0.259	1.04	0.699	0.495
06.	11:6:1S	0.628	1.35	1.08	0.89
07.	11:6:2S	1.91	1.89	1.97	0.87
08.	11:7:1S	1.32	1.94	0.96	1.096
09.	11:8:1D	1.62	2.52	1.74	1.24
10.	11:9:1D	1.84	3.00	2.64	1.06
11.	11:10:1S	1.42	2.45	1.80	1.45
12.	11:11:1S	0.537	1.37	1.57	1.65
13.	11:12:1S	1.12	2.15	1.56	1.32
14.	11:13:1S	1.27	1.75	1.20	1.09
15.	11:14:1S	1.32	2.29	1.72	1.25
16.	11:15:1S	0.322	0.998	0.432	0.33
17.	11:16:1S	0.372	0.842	0.586	0.386
18.	11:17:1S	0.648	1.09	1.25	1.1
19.	11:18:1S	1.23	2.32	1.86	1.35

Table 3 : Mean Fluoride concentrations in pre and post monsoon in two consecutive years 2015&2016.

S.No	Season	Min	max	mean
1	PRE MONSOON 2015	0.137	1.91	0.924737
2	POST MOSOON 2015	0.433	3.00	1.594579
3	PRE MONSOON 2016	0.361	2.64	1.226947
4	POST MONSOON 2016	0.214	1.65	0.942105

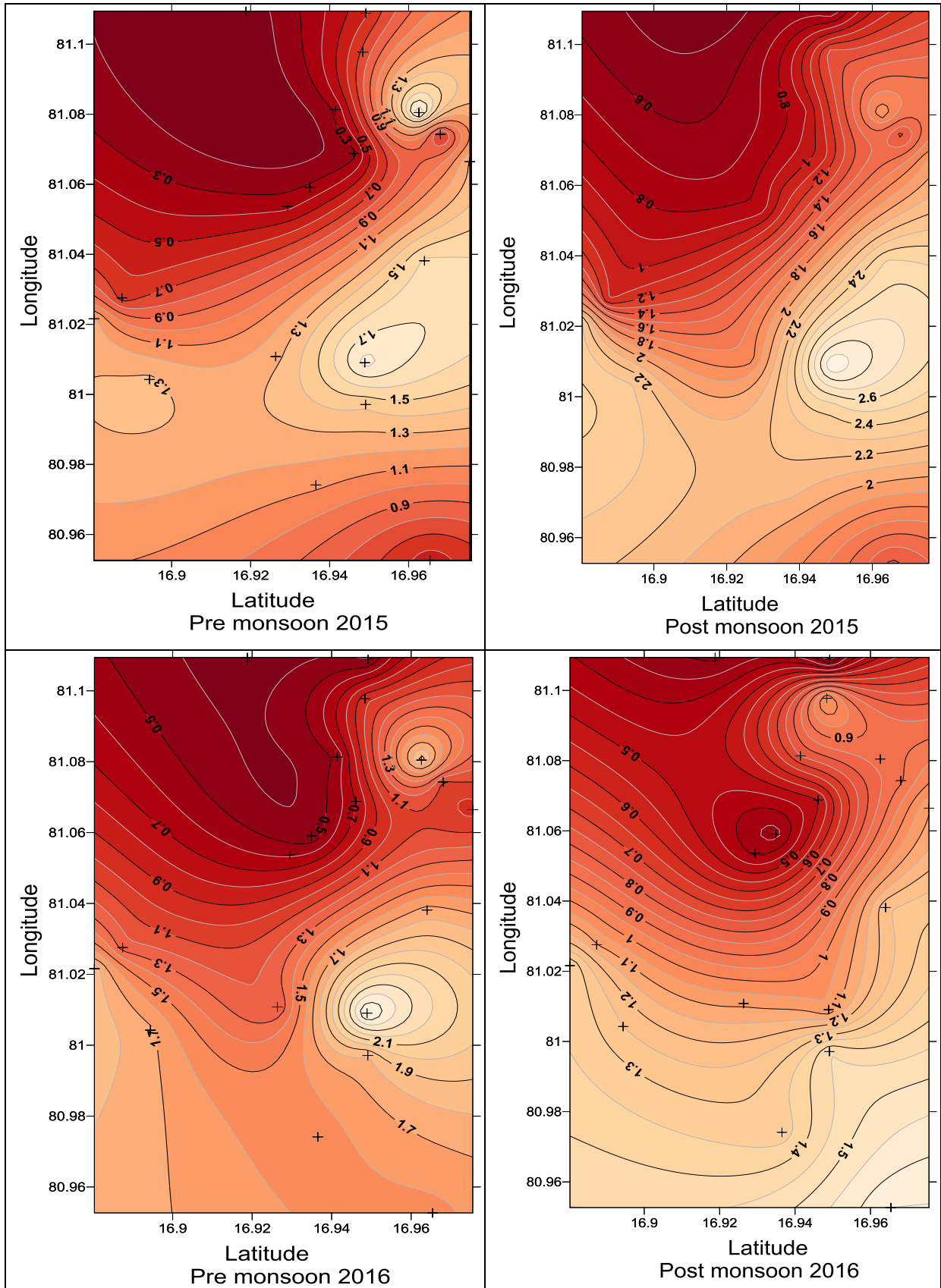


Figure 2: Spatial distribution of fluoride concentrations in different seasons for two years

VII. Discussion

In the above study the fluoride concentrations in Lingapalem mandal are determined in two different years (2015&2016) in two season . 19 samples from different locations were collected .This analysis reveals that,the fluoride concentrations of no two samples were same though collected in same place in different seasons. The contour maps depict the variations in the fluoride concentrations (sometimes increasing and sometimes decreasing) .In 2015,the fluoride levels in pre monsoon are comparatively less than the post monsoon 2015. But the scenario is different in case of 2016 analysis. It occurred that the pre monsoon results for the fluoride levels are more compared to the post monsoon results of 2016.From the above study the fluoride levels of singagudem village were found to be greater than 1.5 ppm which is above the permissible limit (WHO Standards). Spatial Distribution of fluoride concentrations are shown in contour maps.

VIII. Conclusion

By the above study it can be concluded that the fluoride concentrations vary in each season. The fluoride levels of same samples in different seasons are increasing and decreasing due to the irregular rainfall, geological conditions, lithology, Anthropogenic sources effected the fluoride concentrations in that area .

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