BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

SOUTH ZONE, AT CHENNAI

O.A No.148 OF 2021

D. CHANDRAMOULESWARA REDDY AND 8 OTHERS ... APPLICANTS

-VS-

UNION OF INDIA AND 5 OTHERS ... RESPONDENTS

Index

Through

PLACE: HYDERABAD, MRS. H.YASMEEN ALI

DATE: 04.10.2021 Counsel for the Respondent No.5

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

SOUTH ZONE, AT CHENNAI

O.A No.148 OF 2021

IN THE MATTER OF:

D. CHANDRAMOULESWARA REDDY AND 8 OTHERS

...APPLICANTS

VERSUS

UNION OF INDIA AND 5 OTHERS

...RESPONDENTS

OBJECTIONS FILED BY THE STATE OF TELANGANA TO THE REPORT OF THE JOINT COMMITTEE DATED:30.09.2021

MOST RESPECTFULLY SHEWETH:

I, Rajat Kumar, IAS, S/o B.K. Sinha, Aged about 58 years, working as Special Chief Secretary, I and CAD Department, Government of Telangana, do hereby solemnly affirm and state as follows:

I am the Special Chief Secretary, I and CAD Department, Government of Telangana herein and I am filing these objections on behalf of the 5th Respondent herein in the above mentioned case and I am conversant with the facts and circumstances of the present case. I am competent to affirm this objections. I have various objections regarding the report filed by the joint committee on 30.09.2021.

It is respectfully submitted that, I have perused the Report of the Joint Committee dated:30.09.2021; I submit that the findings of the Joint Committee and the recommendations there of are factually in correct and the said report is misconceived one.

The following are the objections for each of the finding given by the Joint Committee:

1. At the outset, the finding of the Committee that it is of the view that Palamuru Ranga Reddy Project is conceived as an irrigation scheme to lift

Special Chief Secretary to Govt.
Irrigation & CAD Department
Telangana Secretariat,
Hyderabad - 500 022.

90TMC of flood water in (60) days from foreshore of the Srisailam reservoir situated on Krishna River is absolutely incorrect. In fact, the PalamuruRangareddy Lift Irrigation Scheme(PRLIS) is originally conceived for dual purpose i.e., for the purpose of providing drinking water to Mahabubnagar, Nagarkurnool, Narayanpet, Vikarabad, Nalgonda, Ranga Reddy and Hyderabad city; the proposed project also serves the supply of water to industrial purpose. Although, the project has an irrigation component, at present PalamuruRangareddy Lift Irrigation Scheme (PRLIS) is implemented to Transport and store water for drinking and human consumption in its first phase; Irrigation require planning and a construction of a network ofCanals originating from the proposed reservoirs; Infrastructural enhancement, such as construction of Canals, would be required for the purpose of Irrigation requiring prior environmental clearance;the same would be carried out only after obtaining prior environmental clearance which is at present conducting of public hearings and submission of proposal for EC is under process; A perusal of G.O.Ms.No.105 Irrigation and CAD Department dated:10.06.2015,substantiate the above statement. A copy of the said G.O is enclosed herewith as **Annexure R-1**.

The above facts were placed on record before this Hon'ble Tribunal in O.A No.273 of 2016 (SZ) filed by Mr.Harshavardhan and on perusal of the same the Hon'ble Tribunal not inclined to stop the work of the project and permitted to carry on the work of the project with regard to supply of drinking water. A copy of the Short Affidavit Dt: 17.02.2017 and NGT (SZ) order copy Dt: 17.02.2017 are enclosed as **Annexure R-2** and **Annexure R-3** respectively.

2. It is respectfully submitted that Muck excavated from the proposed excavation of tunnels is being dumped within the project site and the same will be utilized for manufacturing sand, revetment and concrete purposes,

Special Chief Secretary to Govt.
Irrigation & CAD Department
Telangana Secretariat,
Hyderabad - 500 022.

therefore there is no need for having an Environment management plan to deal with Muck, as stated by the Joint Committee in its report. The situation prevailing with regard to Muck, in all the reservoirs is also used for the said purpose and nothing will be left on ground once the execution of the works are completed. Therefore, there is no damage to the Environment as stated by the Joint Committee.

3. Further, the finding of the Joint Committee that Terms of Reference (ToR) accorded by the Ministry of Environment, Forestand Climate Change (MoEFCC) under the EIA notification, 2006 is completely misunderstood by the Joint Committee, while giving its findings; the finding of the Joint Committee is that the Terms of Reference accorded vide letter dated 11.10.2017 are for carrying out pre construction activities only and whereas the project proponent is undertaking full scale construction on ground. Therefore, they gave a finding that the project proponent has violated the Environmental laws. In fact, the Terms of Reference accorded vide letter dated:11.10.2017 is with regard to Irrigation component of the project/ for the purpose of canal network; the said ToR has nothing to do with the works being executed at present and which are relating to Phase–I works/drinking - water purposes; the said fact has been mentioned in the ToR and the perusal of the same would be make it crystal clear.

4. The finding of the Joint Committee that the project proponent has not confined themselves to drinking water project alone is factually incorrect.

Firstly, the Palamuru-Rangareddy Lift Irrigation Scheme is not conceived only for the purpose of drinking water,also for the purpose of supply of water for irrigation purposes. The works at present being executed are exclusively meant for drinking water purposes; may be as per the present plan 7.15TMC is proposed for drinking water purpose but projects

Special Chief Secretary to Govt.
Irrigation & CAD Department
Telangana Secretariat,
Hyderabad - 500 022.

are not proposed frequently to cater to the need of the people, the States have to keep in mind the requirements of atleast for 30to 40 years future requirements.It is further respectfully submitted that occurrence of the high fluoride concentrations in ground water is a problem faced by the majority of the mandals in Erstwhile Mahabubnagar and Nalgonda Districts. The people living in these areas are facing the problem with fluorosis as ground water in this area aquifers varies from <1.0 to 25.0 ppm. The people in this area are facing major problem with polluted ground water used as drinking and an irrigation source. Mahabubnagar and Nalgonda Districts are poorest and most drought prone districts of Telangana. Inspite of continuous efforts by the Government, external support agencies, NGOs and private enterprises the problem still remains unsolved. Therefore, the Government conceived the Palamuru-Rangareddy Lift Irrigation Scheme as dual purpose, i.e., for the purpose of providing drinking and irrigation to tackle the major problem of fluoride by supplying potable water from river Krishna. Copy of Assessment of Fluoride in ground water is enclosed as **Annexure R-4.**

In so far as, displacements on account of construction of project is concerned,the land has been acquired inThandas and Villages which are coming under submergence and the project displacement families/ project affected families are being compensated as per the provisions of the Right to fair Compensation and Transparency in Land Acquisition Act, 2013.

5. The displacement being caused is only with regard to the construction of reservoirs which are meant for drinking water purpose and in sofaras irrigation component of the project is concerned there is no displacement.

6. In so far as, the remedial measures and recommendations suggested by the Committee are concerned, they are without any substance, in light of the above objections and the factual background that were now placed before this Hon'ble Tribunal for its consideration.

Special Chief Secretary to Govt.
Irrigation & CAD Department
Telangana Secretariat,
Hyderabad - 500 022.

7. It is submitted albeit the reservoirs are built for 64.87TMC, water cannot be used for Irrigation purposes, since Canal network is under planning stage only.
8. The drinking water requirement as per DPR is 7.15TMC,however the water stored will be utilised for drinking water purposes in drought periods in as much as flood is the rare phenomenon therefore, the drawl of water and storing in these reservoirs may be once in (04) years.
9. In a matter of this nature, it is respectfully submitted that the committee should have been given sufficient time to apply its mind to the facts and also the relevant laws and the documents submitted by the project proponent to submit a proper report.
10. Since, the Joint Committee inspected the project site on 15.09.2021 and 16.09.2021 and also filed an interim report on 21.09.2021 seeking (08) weeks time and the same was not accorded, in hurry without applying its mind as to the facts and circumstances and the documentation, the Joint Committee was forced to file its report on 30.09.2021 in as much as, the Original Applications were sought to be advanced, by way of an application from its original date of hearing i.e., 22.10.2021 to 01.10.2021.
11. It is respectfully submitted that in view of the dissenting opinions expressed by the two members of the Joint Committee, the report submitted by the Joint Committee is not final and the same may not be relied upon by the Hon'ble Tribunal for consideration of Original Application.

It is therefore prayed that this Hon'ble Court to consider the objection and reject the findings made in the joint committee report against 5th Respondent in the interest of justice, equity and good conscience and thus render Justice.

Counsel for the 5th Respondent

Deponent

Special Chief Secretary to Govt.
Irrigation & CAD Department
Telangana Secretariat,
Hyderabad - 500 022.

VERIFICATION

I, Rajat Kumar, IAS, S/o B.K. Sinha, Aged about 58 years, working as Special chief Secretary, I and CAD Department, Government of Telangana, on behalf of 5th respondent, do hereby verify and declare that the contents stated are true to the best of my knowledge and that I have not suppressed any material facts.

Date: 4.10.2021

Deponent

Place: Hyderabad

Special Chief Secretary to Govt.
Irrigation & CAD Department
Telangana Secretariat,
Hyderabad - 500 022.

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ANNEXURE-R1

F TELANG

-48-

Chief Engineer (Projects) Inward No. 680 Date: 15-6-15 Mahabubnagar at GADWAL

GOVERNMENT OF TELANGANA
ABSTRACT

PALAMURU – RANGA REDDY LIFT IRRIGATION PROJECT - For Lifting of flood water in 60 days from foreshore of Srisailam Reservoir in Mahabubnagar district to serve net ayacut of 10.00 Lakh acres in drought prone areas of Mahabubnagar (7.00 Lakh acres), Rangareddy (2.70 Lakh acres) and Nalgonda (0.30 Lakh acres) Districts including providing drinking water facilities to enroute villages and industrial water use excluding the ayacut under Medium and Minor Irrigation tanks - Administrative approval for an amount of Rs 35,200 crore – Accorded – Orders – Issued.

==========

IRRIGATION AND CAD (PROJECTS-I) DEPARTMENT

SE/MJP

G.O. Ms. No.105

Dated:10-06-2015
Read:

From the Engineer-in-Chief (Irrigation), Hyderabad, Lr No. ENC(I)/ DCE-IV/OT4/ AEE10/ CE/PRLIS/2015, Dt:04-06-2015 & 09.06.2015.

*****

For CE's kind perusal

ORDER:

In the reference read above, the Engineer-in-Chief (Irrigation), Hyderabad has informed that the Palamuru -Ranga Reddy Lift Irrigation Scheme envisages to irrigate upland areas of about a net ayacut of 10 lakh acres, drinking water to Hyderabad city and industrial use in Mahabubnagar, Rangareddy and Nalgonda districts, by lifting 90 TMC of flood water in 60 days during flood season (i.e., 1.50 TMC per day) from foreshore of Srisailam Project located on Krishna river in Mahabubnagar district to Laxmidevipally(V), Kondurg (M) near Shadnagar town (from +250.00 M to +675.00m) which is the highest elevation in between Mahabubnagar and Ranga Reddy districts with 5 stage lifting and then utilizing water by gravity. The scheme contemplates enroute Irrigation under different reservoirs as per their command ability. There are five stages in the project starting from foreshore of Srisailam Reservoir and ending with K.P.Laxmidevipally Reservoir. The work is proposed to be taken up during the year 2015-16 by calling tenders on e-procurement platform.

12/06/15

2. The ENC has requested to accord administrative approval to the project for an amount of Rs.35,250 crore with SSR 2014-15.

3. The Government after careful examination of the proposal of the Engineer-in-Chief (Irrigation), Hyderabad hereby accord Administrative approval to the Palamuru – Rangareddy Lift Irrigation Scheme for an amount of Rs 35,200 Crore (Rupees thirty five thousand two hundred crore only).

4. The Chief Engineer(Projects), Mahabubnagar shall take necessary action accordingly.

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-8-

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5. This order issues with the concurrence of Finance (W&P) Department, vide their U.O. No. 3526/133/WP/A1/15, dated:08.06.2015.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF TELANGANA)

SHAILENDRA KUMAR JOSHI
PRINCIPAL SECRETARY TO GOVERNMENT

To
The Engineer-in-Chief (Irrigation), Hyderabad
The Chief Engineer(Projects), Mahabubnagar
Copy to:
The Accountant General, T.S., Hyderabad.
The Director of Works & Accounts, Hyderabad.
The Finance (W&P) Dept.
The OSD to Minister for Irrigation.
The P.S. to Prl. Secretary.

//FORWARDED :: BY ORDER//

P.K.V. Lakshmi
SECTION OFFICER

Endst No: CE(P)/MBNR/PRLIS/~~General~~/AEE3/573 Dt:18/06/2015

Copy forwarded to the SE/PJP circle/Gadwal for information and necessary action

TO
The SE/PJP Circle
Gadwal

// F.B.O. //

Deputy Chief Engineer
O/o. CE (Projects) Mahabubnagar,
@ PJP Camp Gadwal - 509 125.
18/6/15

T. KHAGENDER
CHIEF ENGINEER (Projects) (FAC)
Mahabubnagar,
PJP Camp, GADWAL - 509 125
Mahabub Nagar Dist.

ANNEXURE-R2

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

SOUTH ZONE, AT CHENNAI

APPLICATION NO. 273 OF 2016 (SZ)

IN THE MATTER OF:

SRI B. HARSHVARDHAN ...APPLICANT

VERSUS

UNION OF INDIA AND OTHERS ...RESPONDENTS

SHORT AFFIDAVIT ON BEHALF OF RESPONDENT NO. 2 & 3

I, V. Linga Raju, S/o V.B. Raju, aged about 58 years, Chief Engineer, Palamuru Rangareddy Lift Irrigation Scheme, I&CAD Department, Government of Telangana, Hyderabad, Telangana having my office at 5th Floor, Jalsoudha Building, Panjagutta Road, Irram Manzil, Hyderabad, Telangana, presently at Chennai, Tamil Nadu, do hereby solemnly affirm and state on oath as under:

1. It is to be clarified that there is no Department called or functioning as a Water Resources Department in the State of Telangana and it is the Irrigation Department that is responsible for water resources as well. For this reason, the PRLIS project has the word "Irrigation" whereas its intention is to store and use the flood water for dry areas of Telangana, which would otherwise go waste.
2. The Government of Telangana states that it would be withdrawing it Environment Clearance application filed on 11 January 2017 for the reasons below.
3. The Government of Telangana states that it would implementing the PRLIS to move its entitlement and share of water during the flood period from the backwaters of Srisailam Reservoir to the dry areas in the various districts of

Chief Engineer
Palamuru Rangareddy L.I. Scheme
I&CAD Dept., Telangana, Hyderabad

Telangana State including Hyderabad to transport and store water for drinking and human consumption.

4. PRLIS as is presently being planned and implemented, has no plan for provision for irrigation. Irrigation requires planning and construction of a network of canals originating from the proposed reservoirs. The schematic diagram of PRLIS which is being pursued presently clearly establishes that there are no such canals envisaged. Infrastructural enhancements, such as construction of canals, would be required for the purpose of irrigation requiring prior environmental clearance. The same would be carried out only after obtaining prior environmental clearance.

5. It is further reaffirmed that no bids/tenders have been initiated or contracts awarded for irrigation by way of canals.

DEPONENT 17/2/2017
Chief Engineer
Palamur, Ranga Reddy
L.I. Scheme, 5th Floor,
Jalasoudha Building, Hyderabad - 500 082.

VERIFICATION:

I, V. Lingaraju, the deponent above-mentioned do hereby verify that the contents of the foregoing Affidavit are true and correct, no part of it is false and nothing material has been concealed therefrom.

Verified by me at Chennai on this 17th day of February, 2017.

DEPONENT 17/2/2017
Chief Engineer
Palamur, Ranga Reddy
L.I. Scheme, 5th Floor,
Jalasoudha Building, Hyderabad - 500 082.

ANNEXURE-R3

BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

Application No.273 of 2016 (SZ)

Applicant(s)
Sri. B. Harsha Vardhan,
Hyderabad,
Telangana.

Respondent(s)
Vs. The Union of India, Rep. by its Secretary to the Government, MoEF & CC New Delhi and 4 others.

Legal Practitioners for Applicant(s)
M/s. Sanjay Upadhyay,
Kamalesh Kannan. S,
S. Sai Sathya Jith,
Mridula Vijai Raghavan,
Thejesh Jagadish

Legal Practitioners for Respondents
Mr. Mohan Parasaran,
Senior Counsel for
Mrs. H. Yasmeen Ali for R2 and R3
Mr. M.R. Gokul Krishnan for R1 and R5
Mr. Parthasarathy for R4

Note of the Registry	Orders of the Tribunal
Order No. 7	Date: 17th February, 2017 On behalf of respondent Nos.2 and 3, the Chief Engineer, Palamuru Rangareddy Lift Irrigation Scheme filed an affidavit stating that the Government of Telangana would be withdrawing the application submitted for Environmental Clearance (EC) before the Ministry of Environment, Forests and Climate Change (MoEF&CC) on 11.01.2017. The affidavit also asserts that the State of Telangana would be implementing the disputed project only with regard to the supply of drinking water and not for irrigation. Learned counsel appearing for the State of Telangana including the Additional Advocate General, in the presence

	of Sri. Joshi, the Special Chief Secretary present in Court submitted that the disputed project as such will not be proceeded with and the State of Telangana undertakes that they will not proceed with the irrigation part of the project without obtaining prior EC. It is also submitted that the project now proposed to be proceeded with is confined to the supply of drinking water by taking water from Srisailam Reservoir through the Reservoirs in between, which finally reaches K.P. Lakshmidevipalli Reservoir. Learned counsel appearing for the applicant submitted that the project is nothing less than the original project as is clear from the DPR and therefore there should be an order directing the State not to proceed with the work without prior EC. In view of the submission made on behalf of the State of Telangana and the affidavit filed, we do not find it in the interest of justice, to stop the work of the project with regard to the supply of drinking water. It is made clear that no part of the project, with regard to irrigation shall be proceeded with, without prior EC. Learned counsel appearing for the applicant also submitted that there is a separate department namely Rural Water Supply and Sanitation Department for supply of drinking water and the disputed project is envisaged not

	by that department but by the Irrigation Department and therefore by naming the irrigation project as drinking water project there will be no change in the ambit and scope of the project and the affidavit is not filed by the Rural Water Supply and Sanitation Department, and other drinking water projects were already envisaged by the State of Telangana for water supply in the same area. Learned counsel appearing for the respondents seeks time to file proper affidavit from the concerned department. Let the affidavit be filed within a period of two weeks. Learned counsel appearing for respondent Nos. 2 and 3 including the Additional Advocate General submitted that the tender invited for the irrigation part of the project will not be proceeded with. The submission is recorded. List the matter on 15.03.2017 .....Sd/-.....J.M (Justice M.S. Nambiar) .....Sd/-.....E.M (Shri P.S. Rao)

ANNEXURE-R4

Assessment of Fluoride in Ground Water for Drinking and Agricultural Purposes in Ramannapet Mandal of Nalgonda District, Telangana, India

Article · July 2018

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K. Jeevanrao
Professor Jayashankar Telangana State Agricultural University
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June-August 2016; 4(2):169-175

Original Research Article

Assessment of Fluoride in Ground Water for Drinking and Agricultural Purposes in Ramannapet Mandal of Nalgonda District, Telangana, India

D. Vijaya Lakshmi*, K. Jeevan Rao, T. Ramprakash and A. Pratap Kumar Reddy

Dept. of Soil Science & Agricultural Chemistry, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana, India

***Corresponding Author:** D. Vijaya Lakshmi, Research Associate (Soil Science), Dept. of Soil Science & Agricultural Chemistry, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana, India

Received: 19 January 2016 Revised: 01 February 2016 Accepted: 18 February 2016

ABSTRACT

The fluoride concentration in ground water was analyzed during *kharif* and *rabi* (2012-13) seasons to identify the suitability of water for drinking and irrigation purposes in all the villages of Ramannapet Mandal of Nalgonda District, Telangana. Fluoride present in the ground water samples collected during *kharif* and *rabi* varied from 0.53 to 3.86 and 0.99 to 3.94, with an average of 1.71 and 2.08 ppm, respectively. As per drinking water standards, 53 % (16 samples) of the ground water samples in kharif and 67% (20 samples) of the ground water samples in rabi have fluoride content greater than that of maximum permissible limit of 1.50 ppm fluoride. On an average, maximum concentration of fluoride was noticed in 16 and 20 villages during *kharif* and *rabi*, respectively. Therefore drinking water is sufficient to produce severe form of dental fluorosis and mild form of skeletal fluorosis consumed for a long period. As far as irrigation is concerned, data show that none of the bore well and open well water samples have fluoride content above 10 mg L^{-1}, which is the safe limit for all type of crop plants. Thus, all water samples tested in this investigation can safely be used for agricultural purpose.

Keyword: Fluoride; Ground Water; Drinking; Irrigation; Nalgonda

INTRODUCTION

The occurrence of the high fluoride concentrations in ground water is a problem faced by many countries; India is one among the 23 nations in the world. Over all 200 million people in worldwide and 65 million people among 29 states of India are facing the problem

with fluorosis as groundwater of Indian aquifers varies from < 1.0 to 25.0 ppm. The probability of occurrence of high fluoride concentration in ground and surface water was detected in various states in India. Telangana state is facing major problem with fluoride pollution because ground water is used as drinking and an irrigation source, a natural occurrence of excessive amounts of fluoride levels in ground water. Nalgonda district is one of the poorest and most drought-prone districts of Telangana in southern India. The area has long been associated with high groundwater fluoride concentrations which have been reported to reach up to 20 ppm [1]. In spite of continuous efforts by the government, external support agencies, NGOs and private enterprises the problem still remains unsolved.

The main natural sources of fluoride in the ground water of Nalgonda district are weathering and dissolution of rocks and minerals, emissions from volcanoes and marine aerosols [2]. This high concentration of fluoride in drinking water causes dental and skeletal fluorosis in human beings and also has negative effect on crop production. So periodical measurement and control of the concentration of fluoride is very important to avoid both biological and environmental damage. Hence, keeping in view the above facts a survey was conducted to identify the suitability of ground water for drinking and irrigation purposes.

MATERIALS AND METHODS

The study area forms a part of Nalgonda district, Telangana, which is located at a distance of 90 km away from Hyderabad (Fig. 1). This area experiences arid to semiarid climate. The study area goes through hot climate during the summer (March–May) with a temperature range from 30◦C to 46.5◦C, and in winter (November–January), it varies between 14◦C and 29◦C. The average annual rainfall in this area is about 1000 mm, occurring mostly during south-west monsoon (June–September). Groundwater samples were collected during the *kharif* (September) and *rabi* (March) seasons of 2012-13from existing water sources (open wells and bore wells) with the help of a handheld Global Positioning System (GPS).Geographical information *viz.*, latitude and longitude of the benchmark sites were recorded, so that the delineation of the areas having fluoride pollution can be done and ground water fluoride status maps can be prepared by depicting the element in water at village level. Totally 30 benchmark sites were fixed depending on the number of villages of study area for collection of water samples. The depth of the wells varied from 16to about 30 m below ground level.

Water samples were collected in clean polyethylene bottles of 600 ml capacity. The sampling bottles were soaked in 1:1 diluted HCl solution for 24 h and washed with distilled water. In the case of bore wells, water samples were collected after pumping the water for 10 min. In the case of open wells, water samples were collected 30 cm below the water level using a depth sampler. Samples collected were transported to the laboratory and filtered using 0.45µm Millipore filter paper fortified with 1 ml toluene to arrest any biological activity. The samples were stored at 4^0C until used for fluoride analysis. Fluoride was analyzed by using Specific Ion Electrode method [3].

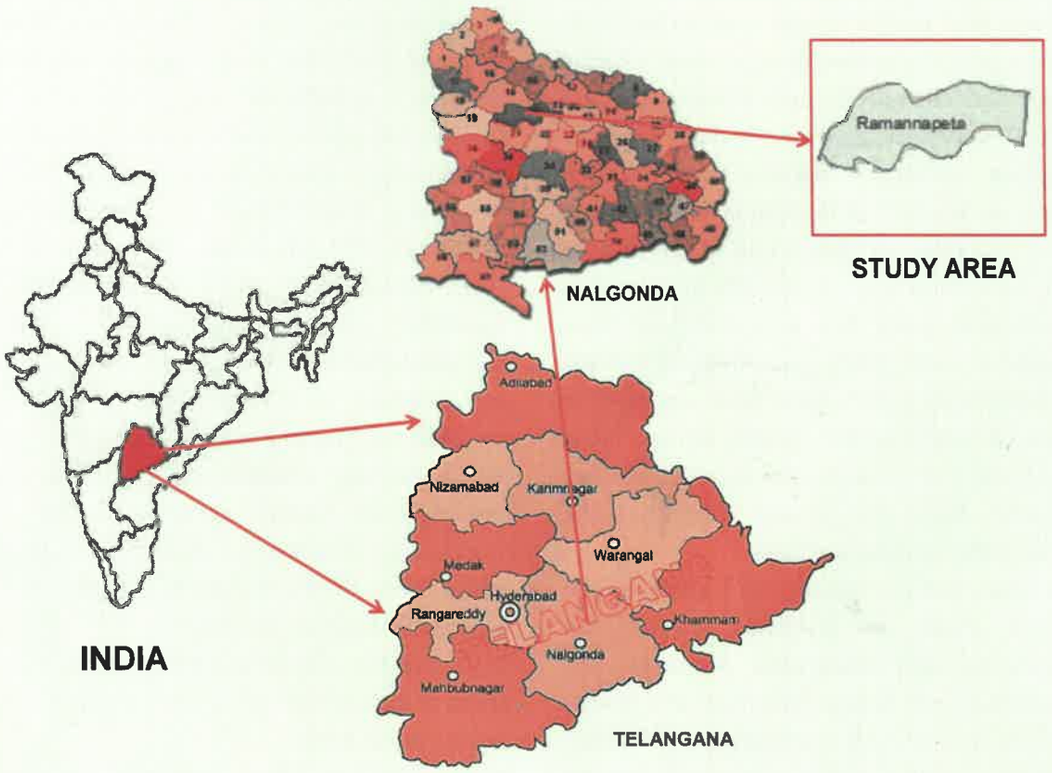

Fig. 1: Location map of the study area

RESULTS AND DISCUSSION

Fluoride content of ground water collected from open and bore wells in the villages of Ramannapet mandals of Nalgonda district during *kharif* and *rabi* are presented in Table 1. Fluoride present in the ground water samples collected during *kharif* and *rabi* varied from 0.53 to 3.86 and 0.99 to 3.94, with an average of 1.71 and 2.08ppm F, respectively. Lowest content of fluoride was recorded in Venkatapuram village (0.53 and 0.99 ppm during *kharif* and *rabi*, respectively) while the highest was recorded in Rontakolla village (3.86 and 3.94 ppm during *kharif* and *rabi*, respectively). Groundwater F status map during *kharif* and *rabi* are shown in figures 2 and 3.

Table 1: Fluoride content in ground water samples collected in different villages of Ramannapet mandal during *kharif* (September) and *rabi* (March) seasons of 2012-13.

S.No.	Village	Fluoride Content (ppm)	
		kharif	*rabi*
1	Ramannapet	1.46	1.51
2	Neernemula	0.78	1.17
3	Shobanadripuram	0.95	1.05
4	Laxmapuram	1.72	2.25
5	Nidhanpalle	0.98	1.21
6	Bogaram	1.03	1.27
7	Thummalagudem	1.15	2.53
8	Yellanki	2.28	2.75
9	Siripuram	2.07	2.12
10	Dubbaka	2.52	2.56
11	Rontakolla	3.86	3.94
12	Munipampula	2.35	2.33
13	Palliwada	0.92	2.58
14	Nagulanchagudem	1.29	3.12
15	Bachuppala	1.37	1.43
16	Suraram	2.43	2.48
17	Thurkapalle	2.76	2.73
18	Venkatapuram	0.53	0.99
19	Kunkudupamula	1.27	1.36
20	Peddabavigudem	2.09	2.52
21	Yennaram	1.98	1.99
22	Kallonikunta	2.04	2.15
23	Kakkireni	0.94	1.29
24	Pilligudem	2.82	2.84
25	Uttatoor	1.54	1.67
26	Iskilla	0.97	1.23
27	Lacchigudem	2.08	2.58
28	Janampalle	2.04	3.12
29	Sanjeevaiahnagar	0.85	1.39
30	Kommaigudem	2.23	2.36
	Range	**0.53-3.86**	**0.99-3.94**
	Mean	**1.71**	**2.08**

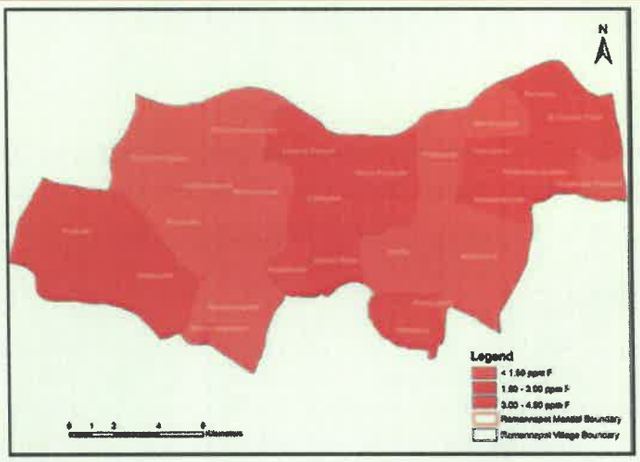

Fig.2: Ground water fluoride status map of Ramannapet mandal (Kharif, 2012)

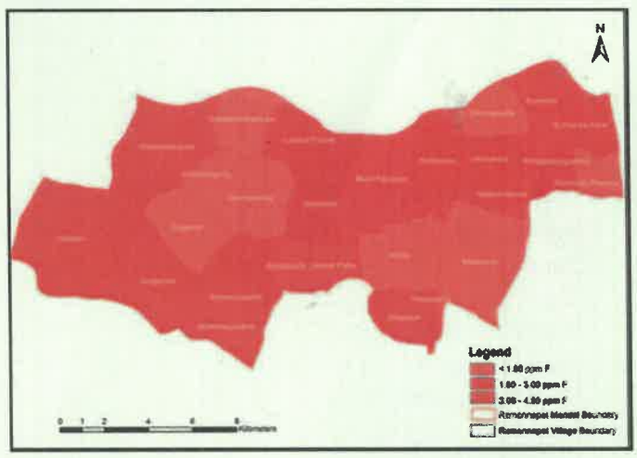

Fig.3: Ground water fluoride status map of Ramannapet mandal (Rabi, 2012-13)

As per drinking water standards of ICMR [4], the highest desirable concentration of F is 1.0 ppm in tropical countries and that of maximum permissible level is 1.50 ppm. Out of 30 samples, 53% of the ground water samples in kharif and 67% of the ground water samples in rabi have F content greater than that of maximum permissible limit of 1.50 ppm fluoride. On an average, maximum concentration of fluoride was noticed in 16 and 20 villages during *kharif* and *rabi*, respectively. Therefore drinking water is sufficient to produce severe form of dental fluorosis and mild form of skeletal fluorosis consumed for a long period. The rocks of this area possess fluoride content higher than the world average. Weathering of rocks and leaching of fluoride bearing minerals from the basement granitic rocks are the major reasons which contribute to elevated concentration of fluoride in ground water. The other important natural phenomenon that contributes to high fluoride is evaporation [5]. Similar results reported by Reddy *et al.* [6] and Kishore and Hanumantharao [7] in Nalgonda district.

According to FAO [8], the normal and moderately suitable range of fluorides concentration in irrigation water is from < 19 ppm (1.0 me L^{-1}) and 19 to 171 ppm (1.0-15 me L^{-1}), respectively. Safe limit of 10 mg F $L^{-1}$of

irrigation water has been proposed for all type of crop plants by Leone *et al*. [9]. The present investigation showed that none of the water samples were found to cross this limits and hence suitable for irrigation purpose. However continuous application of irrigation waters having toxic concentration of fluoride is likely to affect adversely the crop growth.

Especially higher F concentrations were observed in bore well water samples (>1.5ppm) and the F concentration in dug well water samples found to be within permissible limit of 1.5 ppm. The concentration in general, increases with the depth of bore wells and this indicates the possible geogenic nature of fluoride.

SEASONAL VARIATIONS OF FLUORIDE

When compared to two seasons, the concentration of fluoride in groundwater during *kharif* was lower than the *rabi*. Seasonal distribution is found significantly and the variation of fluoride is dependent on many factors. Generally, a high rate of evapo-transpiration and over-exploitation of groundwater resources for agricultural and drinking water purposes during *rabi* season causes a low freshwater exchange and results in precipitation of salts, including F rich salts, temporarily in the top layers of the soil. During *kharif* season, the infiltrating waters leach these soils and replenishment of the groundwater by rainfall indicated a clean recharge from external sources. Hence, the concentration of fluoride is observed to be greater in the *rabi* season groundwater than in *kharif* season. As a result, 67% (20 samples)of the total groundwater samples from the *rabi* season are above the permissible limit of fluoride (1.50 ppm), compared to 53% (16 samples) of those from the *kharif* season.

Seasonal distribution of fluoride is also dependent on amount of soluble and insoluble fluoride in source rocks, the duration of contact of water with rocks and soil temperature, rainfall and oxidation- reduction process [10 & 11].

CONCLUSION

High concentration of fluoride in groundwater of up to 3.94 ppm was measured. About 60% of wells had fluoride concentration above the permissible limit of 1.5 ppm set by Indian drinking water standard. The use of groundwater for drinking purpose from these wells has to be restricted. Suitable measures such as defluorinating the ground water before use and recharging the ground water by rainwater harvesting for irrigation purpose need to be practiced to improve the groundwater quality in this area.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

REFERENCES

1. Rao NS. Groundwater quality: Focus on fluoride concentration in rural parts of Guntur district, Andhra Pradesh, India. Hydrol Sci J 2003; 8(5): 835-847.
2. Rao MS, Mamatha P. Water quality in sustainable water management. Curr Sci 2004; 87(7): 942-947.
3. Wedepohl KH. Handbook of geochemistry (Vol. II-l) (Ed.). Berlin: Springer; 1969.
4. ICMR (Indian Council of Medical research).New Delhi manual of standards of

quality of drinking water supplies special report series 1975; p 44.

5. Brindha K, Rajesh P, Murugan P, Elango L. Natural and anthropogenic influence on the fluoride and nitrate concentration of ground water in parts of Nalgonda district, Andhra Pradesh. J Appl Geochem 2010; 42(2): 231-241.
6. Reddy DV, Nagabhushanam P, Sukhija BS, Reddy AGS, Smedley PL. Fluoride dynamics in the granitic aquifer of the Wailapally watershed, Nalgonda district, India. J Hydrol 2009; 592: 72-36.
7. Kishore M, Hanumantharao Y. A survey on fluoride concentration in drinking water of Tipparthy revenue sub-division, Nalgonda district, Andhra Pradesh, India and batch mode defluoridation with renewable resources. Rasayan J Chem 2010; 3(2): 341-346.
8. FAO. Water Quality for Agriculture. FAO Irrigation and Drainage Paper. Rome: FAO; 1994, p 29.
9. Leone JA, Brennan EG, Danies RH, Robbins WR. Some effects of fluorine on peach, tomato and wheat when absorbed through the roots. J Soil Sci 1948; 66: 259-266.
10. Mahapatra MK, Mishra A, Das BP. Fluorosis first reported in Naupada district of Orissa India. Ecology, Environ Conserv 2005; 11(2): 277-280.
11. Paya P, Bhatt SA. Fluoride contamination in groundwater of Patan district, Gujarat, India. Int J of Eng Stud 2010; 2(2): 171-177.

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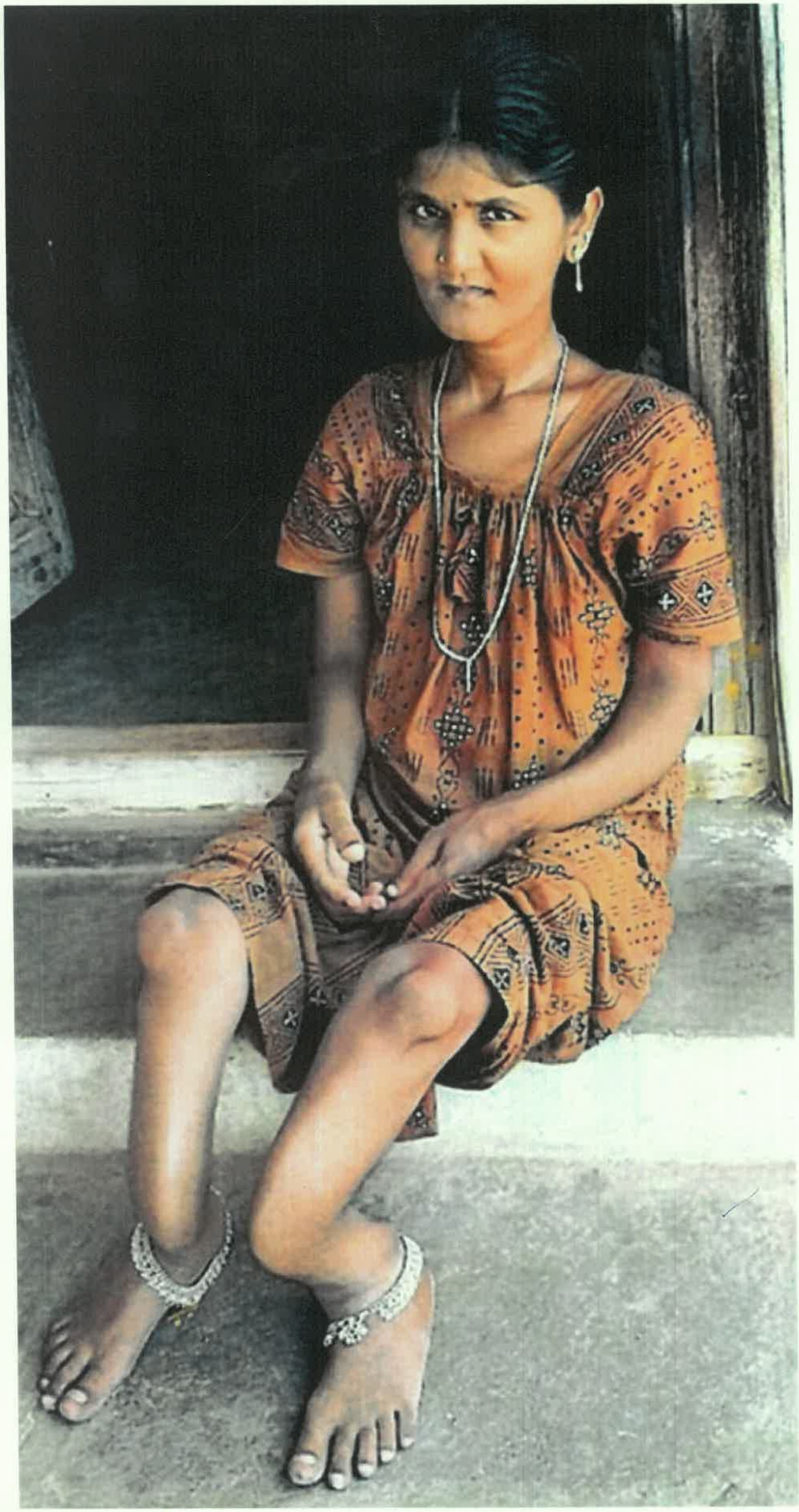

Stages of Fluorosis

- 1) Dental
- 2) Genu Valgum
- 3) Skeletal
- 4) Neurological

- Jhabua photos

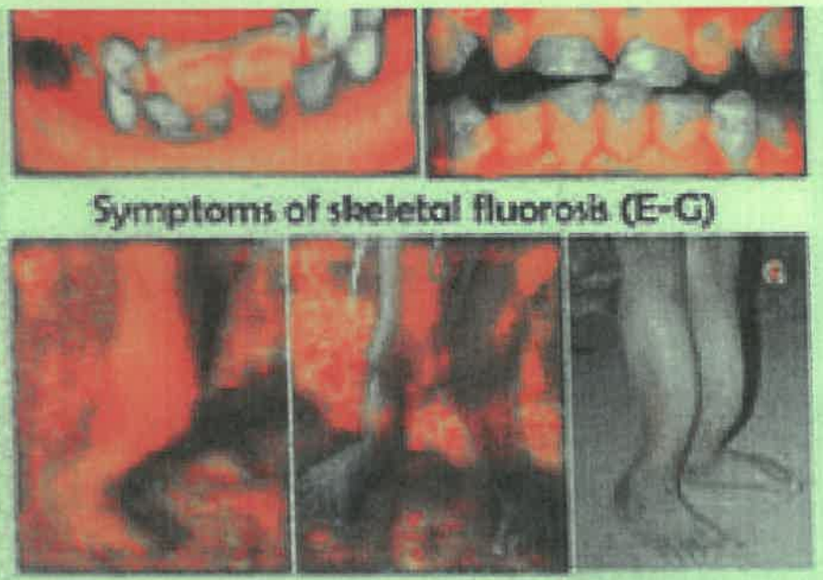

Figure 2: Symptoms of dental (A-D) and skeletal fluorosis (E-G).