

# North Asian International Research Journal Consortium

*North Asian International Research Journal*

*Of*

*Multidisciplinary*

Chief Editor

Dr. Nisar Hussain Malik



Publisher

Dr. Bilal Ahmad Malik

Associate Editor

Dr. Nagendra Mani Trapathi

Honorary

Dr. Ashak Hussain Malik

## Welcome to NAIRJC

**ISSN NO: 2454 - 2326**

North Asian International Research Journal is a multidisciplinary research journal, published monthly in English, Hindi, Urdu all research papers submitted to the journal will be double-blind peer reviewed referred by members of the editorial board. Readers will include investigator in Universities, Research Institutes Government and Industry with research interest in the general subjects

### Editorial Board

J.Anil Kumar Head Geography University of Thirvanathpuram	Sanjuket Das Head Economics Samplpur University	Adgaonkar Ganesh Dept. of Commerce, B.S.A.U Aruganbad
Kiran Mishra Dept. of English,Ranchi University, Jharkhand	Somanath Reddy Dept. of Social Work, Gulbarga University.	Rajpal Choudhary Dept. Govt. Engg. College Bikaner Rajasthan
R.D. Sharma Head Commerce & Management Jammu University	R.P. Pandday Head Education Dr. C.V.Raman University	Moinuddin Khan Dept. of Botany SinghaniyaUniversity Rajasthan.
Manish Mishra Dept. of Engg, United College Ald.UPTU Lucknow	K.M Bhandarkar Praful Patel College of Education, Gondia	Ravi Kumar Pandey Director, H.I.M.T, Allahabad
Tihar Pandit Dept. of Environmental Science, University of Kashmir.	Simnani Dept. of Political Science, Govt. Degree College Pulwama, University of Kashmir.	Ashok D. Wagh Head PG. Dept. of Accountancy, B.N.N.College, Bhiwandi, Thane, Maharashtra.
Neelam Yaday Head Exam. Mat.K..M .Patel College Thakurli (E), Thane, Maharashtra	Nisar Hussain Dept. of Medicine A.I. Medical College (U.P) Kanpur University	M.C.P. Singh Head Information Technology Dr C.V. Rama University
Ashak Husssain Head Pol-Science G.B, PG College Ald. Kanpur University	Khagendra Nath Sethi Head Dept. of History Sambalpur University.	Rama Singh Dept. of Political Science A.K.D College, Ald.University of Allahabad

**Address: - Ashak Hussain Malik House No. 221 Gangoo, Pulwama, Jammu and Kashmir, India - 192301, Cell: 09086405302, 09906662570, Ph. No: 01933-212815, Email: [nairjc5@gmail.com](mailto:nairjc5@gmail.com) Website: [www.nairjc.com](http://www.nairjc.com)**

## **Hydrogeological and Hydrogeochemical Study in Bilaspur District, Chhattisgarh, India.**

A.S.MAJUMDAR  
Research Scholar (Geology)  
DR.C.V. Raman University, Kota, Bilaspur

### **Abstract**

Water supply in Indian cities will fall 50 percent below demand by 2030, predicted in a new UN report launched in Delhi ahead of World Water Day on March 22. The report warns of an urgent need to manage the world's water, more sustainably and highlight the problem of ground water over-extraction, particularly in India and China. It says, 20 percent of global groundwater sources are already over-exploited and warns the problem will only become more acute without better management, with demand expected to rise by 55 percent by 2050.

Arpariver is a main tributary of Mahanadi which is known as the perennial source of irrigation in the state of Chhattisgarh, making the lands of the state fertile from a very long time. Bilaspur is positioned on the bank of one of the prominent branches of Mahanadi- Arpa River. Bilaspur district is a flourishing place which is blessed with an abundance of natural resources. In Chhattisgarh, there are vast stretches of fertile fields that are used for growing a number of high quality crops. Every year Bilaspur contributes considerably towards the state's total crop production. Chhattisgarh is richly endowed with minerals, forests and freshwater source. It has forest cover 44 percent and is home to diverse tropical flora and fauna, with an average annual rainfall of 1250mm.

The state produces some of the best rice varieties and is known as the "Rice Bowl" of the country. The rapid growth of industrialization and urbanisation is the major cause of exploitation of groundwater. On an average, the groundwater level in Bilaspur city has lowered upto 30 feet. Though the physical and chemical parameters like pH, Total Solids, B.O.D. and fluoride are in within range and some parameters such as turbidity, magnesium, calcium are little higher in range due the geological, geographical and enrichment of limestone deposition in the area.

**Keywords: Sustainable, exploitable, perennial, rice bowl.**

## INTRODUCTION

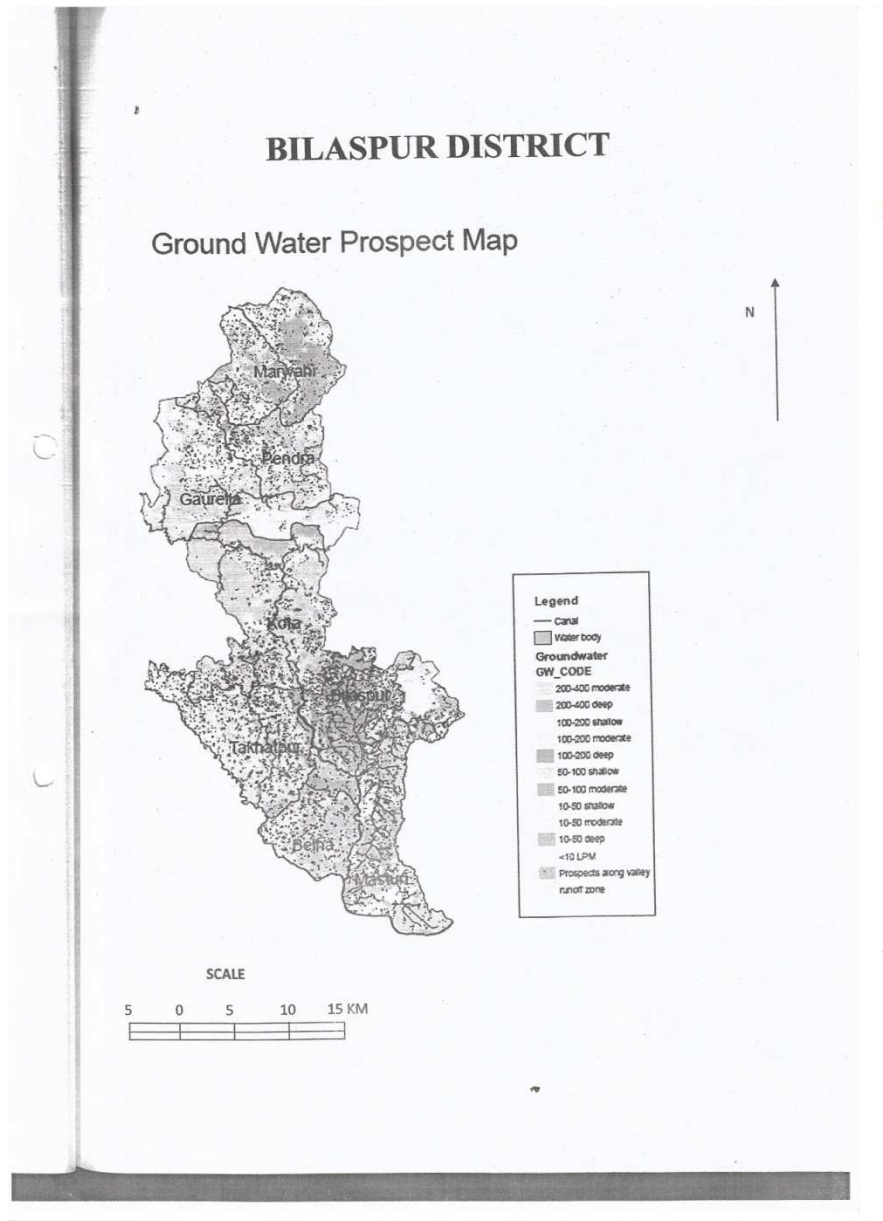
Water supply in Indian cities will fall 50 percent below demand by 2030, predicted a new UN report launched in Delhi ahead of World Water Day on March 22. The report warns of an urgent need to manage the world's water, more sustainably and highlight the problem of groundwater over-extraction, particularly in India and China. It says, 20 percent of global groundwater sources are already over-exploited and warns the problem will only become more acute without better management, with demand expected to rise by 55 percent by 2050. Decades of population growth and uncontrolled urbanization have created a water crisis in India. Our lakes and ponds were once a natural way of recharging groundwater, but they are being destroyed through urbanization. Our sewage goes untreated, so the rivers are contaminated. We used to be very good at managing water in India, but we are losing that ability. We need to divert rainwater drains, which currently flow into the sewage system, to lakes and ponds in order to replenish the water table. In some areas around and within city of Bilaspur city, the groundwater level has fallen by 200 feet (60 meters). Meanwhile all the water that falls in the monsoon is being drained into the sewers and lost the water which is essential to human life is the fresh water and it is 2.8% of the total water resources on the planet earth. Of this fresh water, 2.2% is surface water and 0.6% is present in the form of ground water. 2.15% of fresh surface water is in the form of glaciers and icecaps and only 0.1% is present in lakes and reservoirs and 0.0001% in streams. Out of the total ground water 0.3% is utilizable economically and rest which occurs at depth below 800 m is uneconomical to mined (Raghunath, 1987). It is thus clear that about 0.4% of total water resources available on planet earth is available for direct utilization by man, animals and plants. As such, water is precious to man. The total water resources of the world are estimated at  $1.36 \times 10^8$  million ham. It has been estimated that out of 1460 million acre feet of our river flows, only about 450 million acre feet or one third can be utilized for irrigation. Ground water is that part of precipitation that soaks into the soil through the openings and keeps on moving underground. It is estimated that the average rainfall is about 30 inches. One can assume that one third of these enter into soil, i.e. 640,000 tones of water for every square mile. If half of this quantity could be extracted, it would yield continuous supply of one cusec for 136 days and this could be sufficient for irrigation of about 250 acres. It is well known that during 21<sup>ST</sup> century, this world is likely to face serious problems of energy, natural resources and environmental pollution. However, the greatest pressure of increasing population, agricultural and industrial growth is on the water resources and is thought to be one of the most critical factors in development. Increased groundwater withdrawal and erratic monsoon, the groundwater levels are dealing in many parts of India including Madhya Pradesh as well as in Chhattisgarh region. Chhattisgarh is a new state, established in year 2000. Bilaspur region is one of the major parts of this state achieving higher economic status.

Bilaspur is a district of Chhattisgarh state of India. Bilaspur city is the headquarters of the district. As of 2011, it is the third most popular district of Chhattisgarh (out of 18) after Raipur and Drug. The name of the district derived from the city of Bilaspur. The name Bilaspur originated from Bilasa, a fisher woman who founded it according to a legend. Bilaspur district is situated between  $21^{\circ}47'$  and  $23^{\circ}8'$  north latitudes and  $81.14'$  and  $83^{\circ}15'$  east latitude. The district is bounded by Korba (a district) on the north, Anuppur district and Dindori district of Madhya Pradesh state on the west, Kawardha on the South west, Drug and Raipur on the south and Korba and Janjgir-Champa on the east. Bilaspur district consists of 8 Tehsils. These Tehsils are Bilaspur, Pendra road,

Lormi, Kota, Mungeli, Takhatpur, Bilha and Masturi. Bilaspur district, Chhattisgarh has a population of 2,663,629, equal to the nation of Kuwait or US of Nevada. This gives it a ranking of 152<sup>nd</sup> in India (out of total 640) . The district has a population density 322 inhabitants per square kilometer. Its population growth rate over the decade 2001-2011 was 33.21%. Bilaspur has a sex ratio 972 female for every 1000 males, and a literacy rate of 71.59%. Bilaspur has the zonal office of South-East- Central Railway, the 16<sup>th</sup> zone of Indian Railway, which is recognized to have the maximum loading.. The total area of Bilaspur is approximately 6377 sq.km. It is hilly towards north and plane in south which lead to quite cold and hot respectively. The maximum temperature of Bilaspur district is 45°C and average rainfall is 1220 mm. Major rivers which surround Bilaspur district are Aagar, Maniyyari and Arpa. Among this Arpa river is lifeline of Bilaspur. It is originated from Khondari-Khongsara, at Pendra and flows to meet with Seonathriver at Thakur deva near Bartoti that in turn meets with Mahanadi. The river Kharang is a major tributary of Arpa river. The length of Arpa is about 147 km and average water flow is 400m<sup>3</sup>. River catching area is 2022 sq.km. Due to drying of river, the underground water level of Bilaspur is going down day by day, which is appearing as major problem to the growing population. Arpa River is a main tributary of Mahanadi which is known as the perennial source of irrigation in the state of Chhattisgarh, making the lands of the state fertile from a very long time. Mahanadi interests the various districts of Chhattisgarh. Bilaspur is one such district which positioned on the bank of one of the prominent

Drilling of a deep bore well in Uslapore Area of Bilaspur



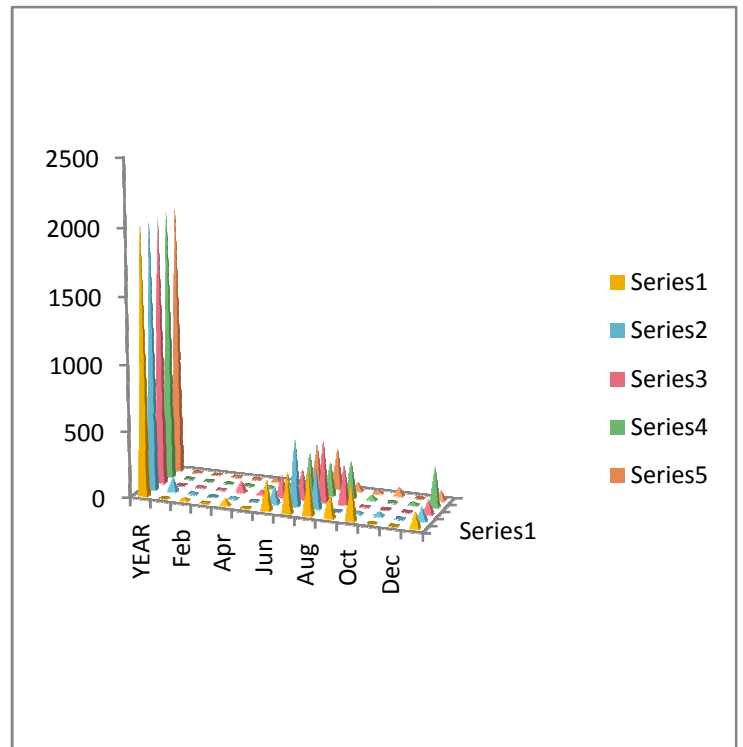
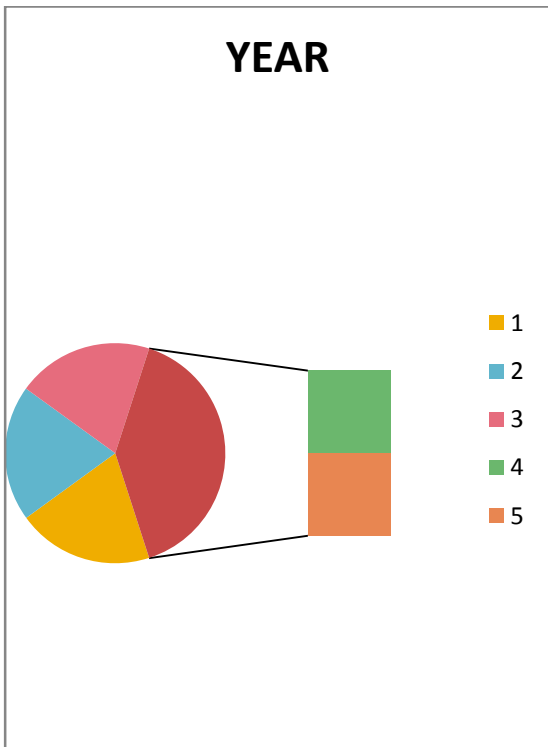


The geometric progression of population in urban and rural areas of Bilaspur city and continuously going down groundwater level is the most vital issue for the Chhattisgarh government. This is the reason that, unjustified and over exploration of groundwater, government will draft a law very soon. By this law, a prior permission will be required from Underground Water Authority before digging bore well or dug well in any city area or village area. Not only this, but corporation will be accountable and responsible to answer, how much water is being supplied against the population. To save the underground water through water harvesting, watershed management or water-recharge, government will try to apply water draft bill. By this bill not only people but

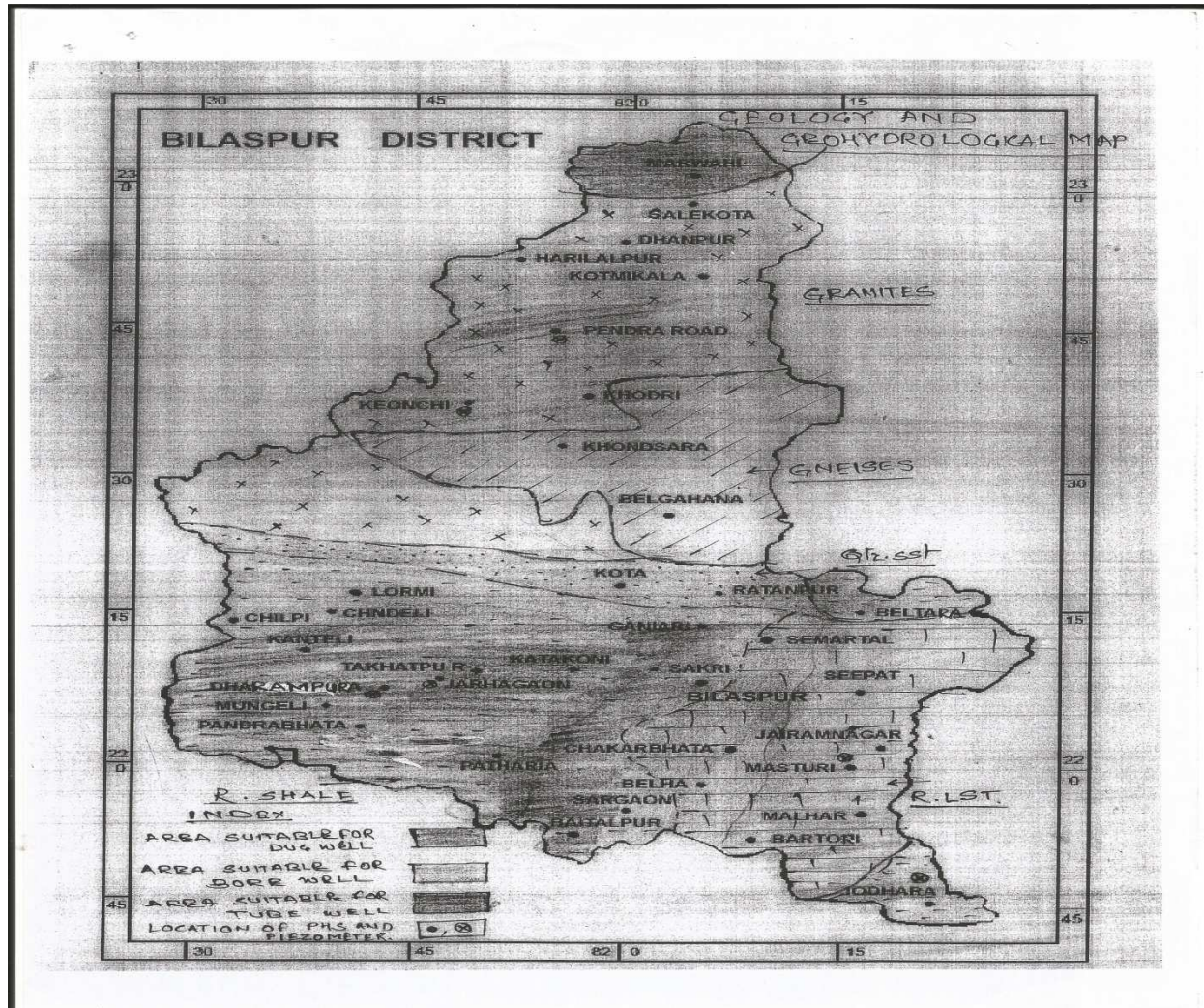
also the parties need to answer who supply water for domestic or commercial purposes. The depletion of underground water is not only Chhattisgarh state or other states but become a burning problem for the country too. The rapid growth of industrialization and urbanisation is the major cause of exploitation of groundwater on and average the groundwater level in Bilaspur city gone upto 30 feet down. Many places in the city,

**Bilaspur District Rainfall (mm) For Last Five Years**

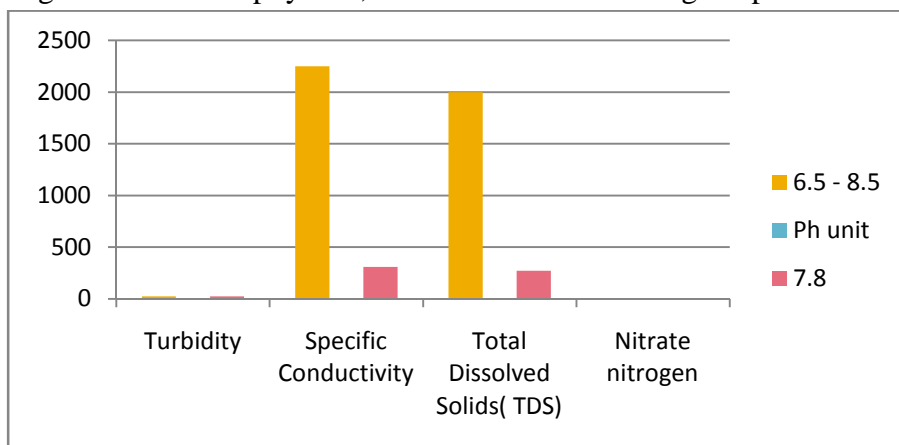
YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
2009	1.2	24.4	8	50.9	4.4	229	304.3	350.7	186.3	290.3	0.0	0.0	120.8
2010	106.3	14.8	0	19.1	6.4	126.3	495.9	318.6	204.8	19.3	32.0	6.6	104.1
2011	0.1	11.4	8.9	82.3	35.6	161.9	226.1	463.9	290.9	9.0	0.0	0.0	107.5
2012	3.3	3.5	0	6.3	19.6	51.5	300.3	250.5	273.7	36.4	7.3	21.4	306.4
2013	7.8	0	8	9.7	23.5	43.1	314.8	301.9	62.6	28.0	63.4	0.0	71.9



BILASPUR DISTRICT GEOHYDROLOGICAL MAP



Chemical analysis of groundwater for physical, chemical and bacteriological parameters in Bilaspur District.





**WATER QUALITY IN BILASPUR DISTRICT**

Source: CG Environment Conservation Board, Regional Office, Bilaspur, C.G.

S.No.	Characteristics	STANDARD / LIMIT	Unit	Result
1	Temperature	--		28
2	Appearance	--	--	C
3	Odour	--	Threshold No	OL
4	Ph	6.5 - 8.5	Ph unit	7.8
5	Turbidity	25	NTU	26
6	Specific Conductivity	2250	Micro mhos	310
7	Total Dissolved Solids(TDS)	2000	Mg / L	274
12	Nitrate nitrogen	100 mg / L	"	0.968
13	Nitrite nitrogen	50 mg / L	"	0.887
15	Chloride	1000 mg / L	"	36
16	Sulphate	400 mg / L	"	10.14
17	Coliform	50 Or Less	MPN / 100 ml	--
18	Dissolved oxygen (D.O.)	6 mg / L	Mg / L	8
19	C.O.D.		"	38
20	Total Alkalinity	600 mg / L	"	110
21	Total Hardness	600 mg / L	"	96
22	Calcium Hardness	75 mg / L	"	48
23	Magnesium Hardness	30 mg / L	"	50
24	Fluoride	1.5 mg / L	"	0.144

## SUMMARY & CONCLUSION

The water resource of the study area is evaluated on the basis of manageable spatial hydrologic unit. It is considered that the area needs proper management through conservation and harvesting structures and conjunctive use of surface and groundwater. Careful planning and management will safe guard it for the benefit of present and future generations. Pollution effect is not encounter due to effluent point and other man made source. Water quality's essential for the rotational management of water resource. Chemical quality of water sample of Bilaspur district evaluated to establish their suitability for drinking water.

Arpa River is a main tributary of Mahanadi which is known as the perennial source of irrigation in the state of Chhattisgarh, making the lands of the state fertile from a very long time. Mahanadi interacts the various districts of Chhattisgarh. Bilaspur is one such district which is positioned on the bank of one of the prominent branches of Mahanadi-Arpa River. Bilaspur district is a flourishing place which is blessed with an abundance of natural resources. It goes on making the agricultural lands of Bilaspur more fertile. The quality of underground water is analysed by the P.H.E. (Public Health & Engineering) department and found that most of the parameters like pH, Turbidity, Total Hardness and other minerals like Ca, Mg, Chloride, Iron and Fluoride are within the limit. The Arpa River is one of the vital strong holds of Bilaspur district in Chhattisgarh. Due to drying of river, the underground water level of Bilaspur is going down day by day, which is appearing as major problem to the growing population. By and large the growing city like Bilaspur in Chhattisgarh district is facing the problem of underground water present day and will be faced severe crisis in next decade. But the quality of underground water as data reveals that it is still remain same as was previous decades. Of course, the water quantity required for future can be managed through surface water by managing and saving river water from the encroachment and pollution.

It is responsibility of Government sectors, Non-Government sectors. Corporate. Farmers, Agriculturalist and civilians to prevent, protect the hydrogeological and hydrogeochemical parameters in the Bilaspur region.

**REFERENCE**

1. Bose, P.N. (1899 – 1900) - Unpublished Progress Report, G.S.I.
2. Dutt, N.V.B.S., (1963) - Stratigraphic and correlation of the Indravati series (Purana Group) of Bastar.
3. Dutt, N.V.B.S., (1964) - A suggested of the purana formation of the southern part of the Chhattisgarh, M.P. Geological Survey of India, vol.93, pt.2, pp. 143 – 148.
4. Ghosh, P.K. and Shah, S.C., (1965) - On the occurrence of stromatolites from the Raipur limestone M.P. Proc. India Sc. Cong. 51<sup>st</sup> 52<sup>st</sup> Abstract, 196p.
5. IS: 10500 (1991) - Indian Standard Drinking Water Specification. Bureau of Indian standards New Delhi, 5p.
6. Murti, K.S., (1978)(b) - A study of the stromatolites of Chhattisgarh Basin. Symposium on Purana formation of peninsular India, Centre of Advanced Study in Geology, University of Sagar, M.P. pp. 276 – 281.
7. Todd, D.K. Underground Hydrology.
8. Water Testing Result from C.G. Environmental Conservation Board.
9. News Paper Cutting, DainikBhaskar Edition, Bilaspur, 2011.
10. Murty, J. V. S., Watershed Management, pp. 9, 13, 63.
11. Sujit Kumar,(2002)- Water Resource Evaluation Study of the Son Barsa River basin district Rajnandgaon( Chhattisgarh) pp. 96-98.
12. Nagar Nigam Bilaspur dwara preshit Nagar Nigam Kshetra ke Jal Namuno ka Parikshan Report.

## Publish Research Article

Dear Sir/Mam,

We invite unpublished Research Paper, Summary of Research Project, Theses, Books and Book Review for publication.

**Address:-Ashak Hussain Malik House No-221, Gangoo Pulwama - 192301  
Jammu & Kashmir, India  
Cell: 09086405302, 09906662570,  
Ph No: 01933212815  
Email: [nairjc5@gmail.com](mailto:nairjc5@gmail.com)  
Website: [www.nairjc.com](http://www.nairjc.com)**