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Studies of ancient sacred water to purity of present drinking water with reference to Bihar River Basins

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Abstract: *Water is an extraordinary abnormal liquid and omnipresent compound from very outset of civilization in all scriptures and testaments .In ancient India the importance of pure water was too much and for that reason the king of all Gods Indra was made the authority of protection and judicious distribution of rain water on the earth which is the purest form of water from natural resources .We have focussed our studies on purity of drinking water in the state of Bihar which is larger in area and thickly populated 1102 person per sq.Km. Depletion of water table in most of the district of the state are going to be trapped in arsenic, iron and fluoride contamination. The state has an average 50 rainy days. It is divided into two parts by holy river Ganga, Koshi is another perinial river of north Bihar originating from Himalayan basin in Nepal. This piece of study was to carried out the characterization of drinking water coming from different resources including underground water collected from different parts of state from popularly used up resources by local population. For each sample their TDS, TSS, PH, EC, DO, COD, concentration of Mg(II),Ca(II),nitrate, sulphate, were determined and compared with BIS and MCI desirable limit*

Keywords: *sacred, riverbasin. toyam, vein, basin. Termite, nano, perinial, fetor*

I. Introduction

Water has come on the earth before living system has started growing .In Vedic period water was taken as most sacred among all known material particularly from river Ganga, Jamuna, Narmada, Sarswati and Kauveri recited as.

Gange ca yamune chaibo godawari saraswati |
Narmade, sindhu, kaveri jale asmin sannidhim kuru ||

It means that O`holy Mother Ganga ! o` Yamuna! O` Godawari ! O` Saraswati ! O` Narmade ! O` Sindhu ! Kaveri ! may you all be pleased to be manifest in those water which shall purify my self !

Here prayer means to keep them pure and to be used for sustaining life on earth. In Y.Veda rivers have been honoured as

O`m namah sikatyay ca, prabahayay ca,namah kingwam shilay ca kshaymay ca; namah kapardine ca pulastaye ca namai hiranyay ca prapashyay ca I Y.V.16.42

The idea behind this sootra was to keep protected all such component of river through which it retains purity of its water like sand of river .insects living there,courrie. Tortoise.and all those living and non living materials developed in the river; here their prayer meaning provide them protection and opportunity to grow more and more.

In Rig Vedic system water has been recognised by prayer like

The waters of Sky,
The waters of rivers,
And waters in the well
Whose source in the ocean.
May all these sacred water
Protect me. R.V

Kautilya in his Arthsastras has declared water among only three gem of the planet earth.

Prithivyam trini ratanani jalam annam shubhashitam |
Mudhah pasham Khandesu ratna sangyam ridhiyate ||

Kautilya 14

Water, food and good preaching are the only three gem on the earth but foolish declared piece of stone as gem-store.

They have also prescribed area for developing Colonies Where drinking water is penultimate and recited as

Dhanikah, shrotriya raja nadee vedachastu panchmah ||

Panch yatra na vidyante na tatra diwase waste ||

Kaut-1.9

The best colony is that whose inhabitants are scholar.wealthy ,warrior king; physician and developed at the coast of perinial river..This principle were very much in practice in that period and this is the reason that Gangetic belts have high population density.They have also recognised rain water as its purest form through sootra recited here as

Nasti medha samam toyam, nasty chatsamam valam |
Nasti chakshusamam tejo ,nasty dhanyasamam priyam ||

Kaut. 5.17

Here toyam means rain water. Next to oxygen water is second most important component for life survival. However water is much more complex than simply that we look it and constitute more than 70% of the earth planet surface. It is mostly found in liquid State which is drinkable although majority of liquid water is found in ocean which is saltee and other source is ground water a part of water cycle. The water evaporated by sun ascends to atmosphere through the capillary of air, and their gets condensed. After forming clouds rains by force of air. Hence water is not lost only converted into another state completing water cycle as recited in Rigveda as.

It is indispensible and one of the precious natural resources of the planet and ground water is an important source of water supply through out the world as reported in J.Env protect-2sf(2005). It is prime need for human survival. The chemical composition of ground water/under ground water on the BIS scale declars its suitability for domestic use, Agro use, or drinking water purposes geology of the area under study decides the purity of water both ground and under ground sample. Ground water flowing through the different sediments, and aquifers meeting various soil component. Ground water has to face different geological and soil condition and man made contamination through industrial and another liquid/solid waste discharge. The purity of river water also controlled by their speed and it has been coming out from ancient days that faster the speed better the quality of water as recited by Kautilya in his Sootras as.

Bhasmana shudhyate kasyam; tamramlen shudhyati |
Rajsa shudhyati naree; nadee vegen shudhyati ||

Kaut- 6.3

Presently lower speed of Ganga water due to less discharge of waters causing serious water pollution and have come as national challenges.

II. Underground Water

In addition to rain water, surface water the study of under ground source of water was very much in practice in ancient India. They had vast knowledge of surveying and locating with quality the existence of underground water Varah mihr was known to be the great hydrologist of ancient India he has mentioned details in his In the Varahmihir`s Vrahat sanhita (550AD) three chapters are devoted to hydrology comprising pregnancy of clouds (Ch-21); pregnancy of air (Ch-22); quantity of rain fall (Ch-23) and the slokas of Ch-54.1-2 ppropounds the method of surveying under ground water that has been recited as

Dharmyam yashashyam va vadabhaytoham dakargalam yen jaloplabdhiha
Punsam yathagdeshu shirastathaiva chhitavapi pronnatnimnasanstha.
Ekayna vardayna rasayna chambhyashchyutam namasto vasudha vishayshanta
Nana rastvam bahuvarnatam cha gatam pareekshyam chhititulyamayva

Vraht. Samhita-Ch-54,1-2

Kautilya in his Arthasastra has used to find under ground water from termite mounds on earth. If there is a termite in the east direction of Jambu tree plenty of drinking water may be found at the depth of two Parushas and at a distance of three hastas to the south of the tree like-wise same is for Arjuna tree in the north water is at the depth of 3.0 purshash and 3.5 hastas to the west of the Arjuna tree.

In modern science too termites are taken as living Nano particle having connected to his fellows from beginning to end and continuously transmitting or exchanging essential information to each other for their safety and feeds. The study of our scriptures reveads that ancient Indian scholoar Pandit/Brahman/Rishi like sarasvatu, Manu, vrahmihir, Kautilya, have scientific bent were not only interested in exploring the means of storing rain water but also exploring the methods of locating underground water resources. They had found that water veins under the earth to be full of flowing water like the flow of blood in hman body through is veins.

Vibhaktasi chitrabhano sindhoroorma upak aa
Sagho dashushay chharasi.
Nadam na bhinnamuya shayanam mano ruhana atim yantyapah
Yashchidwatro mahina paryatishthattasamhih patsutah shirbbhoova

R.V.1.27.6,1.32.8

Not only limited to that they have further sub divided into hundreds and thousands of streams at different levels causing life of different plants and trees on the earth. These works claim that on the basis of existence of certain plants and trees on the earth under ground water resources, their quantity and quality may be explored, particularly where the surface water is either absent or available in small quantity. There are other methods like smell and colour of soil & rocks may used to assess wheather the water is suitable as drinking water or not. Annual replenisible of ground water in Bihar during Mansoon season from all resources are about 29%. Where as in non-monsoon season it is 10.77% as compared to our demands it has to be developed upto 39%. Due to uncontrolled pollution, green house effect unbalanced misuse of natural resources generally in Bihar we have 10 to 100 rainy days. Bihar is situated on Ganga, Brahmputra basin having drainage area 321289 Km^2 has aurge mansoon rain 110 mcm and average mansoon runoff 878800 mcm and committed storage of surface water project 150963 mcm where as surface water available for recharge is 587120mem. At present almost all Bucks of Bihar are under critical zone for availability of ground water.

III. Sample Collection

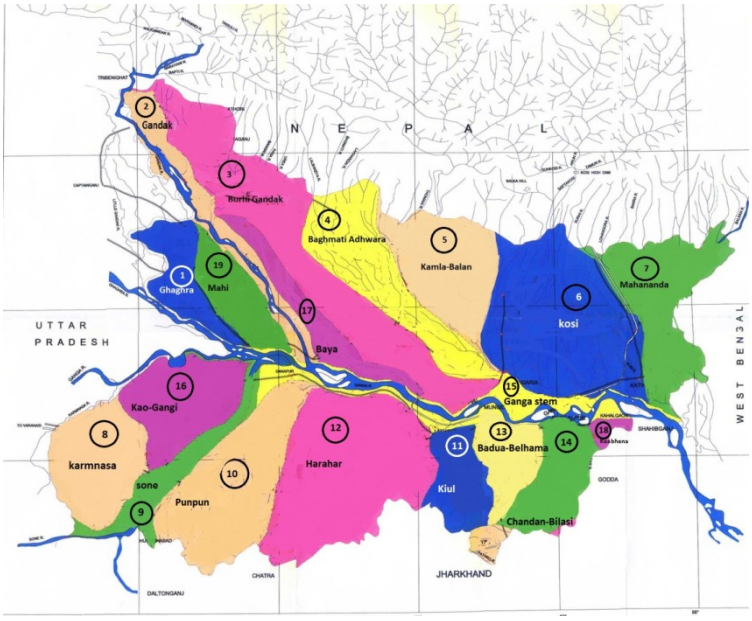
After going through the detail and exhausting survey of available literature at Kelkar library IIT Kanpur and datas available through electronic and hard copy journals & books and report of different NGO's a total of 19 samples were collected from different water resources while doing it all possible cares have been taken in selecting the proper sample minimising the chances of contaminations. In case of river water which may change rapidly with time and depth so care was taken to collect from fixed depth and tried to protect from external microbials. Many precautions were taken about leaching of contamination from container in which it is kept before testing. It was stored in a sealed pre sterilized pack below 277 K before sending to test laboratory. Similarly all precautionary measure were taken in collecting sample from under ground source of water, their adjoining soil layers sample was also collected for colour and odour examination.

Bihar has sufficient perinial sources of water but they are unmanageable and discharge into ocean, it is unfortunate part of the state is that at the sametime when north part is flooded with water south Bihar suffers from draught . the demography of the state is that its population is about 90 millions, out of which 90% belongs to rural area, having 21^0-58'-10"-27°-31'-15° N latitude and 82°-19'-50"-88°-17'-40" E longitude. It is 53m high from sea level, having 94163 km^2 area, with about 50 average rainy days and population density 900 person per square K.m about 50% of literacy

IV. Water Sampling

Bihar is divided into 19 river basins, based on the prominent river crossing through that zone and area covered by their water. In this study my plan is to collect one water sample from each basin as show in the map and their number also. The number encircled is our sample number for investigation

In this study ten water samples were collected from different parts of the state ,shown in the map .The water sample were collected in pre sterilized borosil glass bottle cleaned properly by rinsing thrice with distilled water and each sample was analysed



V. Methodology

The samples were put to examination in the laboratory to determine physical chemical and biological parameters.The reagents used were AR grade and double distilled water was used for preparing reagents and solution.TDS,TSS and PH were measured with digital water kits DO,COD wewre measured in professional labs on payments.The drinking water sample were collected from different area of the state that includes tiver water, hand pump water, supply water and dam water and deep bore water also. The study plan is to evaluate the parameter significant for portability purpose and datas.

VI. Results And Discussion

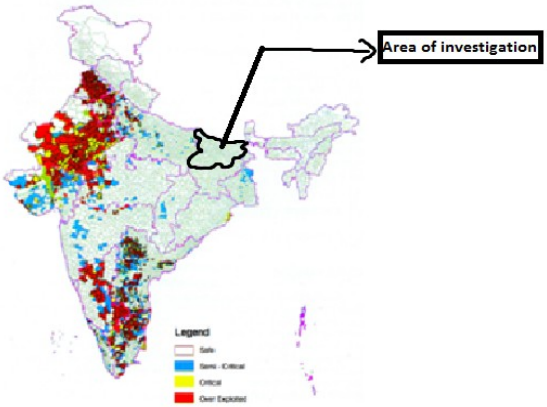
Physico chemical characteristics of water samples of Bihar river basins

S.No	PH	TDS Mg/L	EC	TSS	BOD	DO	COD	Nitrate	Chloride	Sodium	SO_4(-II)	F(-J)	Co(+II)	Mg(II)
WS.01	7.11	503	377	51.75	1.41	0.99	2.25	1.43	40	146	6.0	2.46	105	28
WS.02	7.32	268	480	42.0	3.38	1.48	7.51	2.00	12	121	9.01	0.16	63	9
WS.03	7.08	307	441	32.06	1.00	1.67	2.38	2.94	26	165	92	0.10	72	8
WS.04	7.24	418	540	416	1.00	1.85	2.19	11.50	21	105	12.1	0.30	84	14
WS.05	7.42	388	108	42.00	0.99	2.20	2.09	7.46	18	176	11.1	0.58	89	20
WS.06	7.26	380	491	32.82	1.01	2.01	1.79	1.30	20	124	9.1	0.47	95	12
WS.07	7.49	421	590	52.01	0.91	0.98	1.85	12.60	24	105	5.0	0.92	92	16
WS.08	7.2	186	252	47.0	1.01	1.6	1.25	2.65	10	116	18	0.46	91	08
WS.09	6.9	426	481	44.2	0.54	1.7	16.9	1.92	06	184	07	0.34	74	14
WS.10	7.3	720	306	36.48	1.38	1.4	2.05	2.01	18	157	04	0.21	60	06
WS.11	7.02	655	318	41.2	1.25	0.96	1.98	1.99	0 5	117	05	.19	65	07
WS.12	7.11	718	350	40.01	0.98	1.01	1.95	1.84	07	102	07	.27	68	07
WS.13	7.03	716	408	39.07	1.26	1.06	2.01	2.40	07	115	09	.26	62	06
WS.14	7.08	612	398	36.25	1.03	1.42	2.06	2.02	08	90	06	.25	59	08
WS.15	7.40	717	299	40.04	1.40	1.43	2.00	2.16	09	96	12	.29	61	06
WS.16	6.96	312	603	33.0	1.09	1.4	1.66	1.69	21	106	9.4	.21	66	12
WS.17	7.21	388	487	39.0	0.96	0.98	1.49	2.92	36	124	10.2	0.37	72	14
WS.18	7.06	364	501	41.06	1.03	0.96	1.87	2.16	27	121	11.6	0.48	83	11
WS.19	7.11	297	488	37.42	1.06	1.05	1.92	2.19	32	137	12.05	0.31	105	16

All of the water samples were colourless fetorless but in the case of underground water sample their surrounding soil have smell of rotten eggs and in some cases faint smell of chlorine was also detected The PH parameter indicated that most of the sample was either acidic or neutral or weakly alkaline as recorded in the table the actual values ranged between 6.9-7.49 and it were under the prescribed limit of BIS and MCI whichis7.0--8.5. The value of total dissolved solid[TDS] and total suspended solid [TSS] were recorded in the table ,TDS was in the range from 186mg/L--720mg/L where as BIS is 500mg/L one of the sample has 18% higher to BIS that may be due to variation in soil composition.TSS value was in the range of 32.06--52.01 Durfor and Ranjan has reported high TDS(3200mg/L) in the water of Kotputli Rajasthan.In one of the sample SW-8 collected from Bhimbandh a hot water lake in the deep forest area of Munger District has TDS (186mg/L) and was too tasty to drink as reported by local inhabitants water has very high digestive strength for food and strong washing capacity.Electrical conductivity (EC) was found in the range of 108µS`--590µS which is below permissible limt 1400µS of BIS Patil and Patil reported in his studies that high EC was found in the water of Amalner Town ground water where it is up to 2827µS. Concentration of Mg(II),Ca(II).F(-I).sulphate,nitrate recorded in the table are under the limit of BIS and MCI. Sulphate is naturaly found elements as gypsum and some other commaon minerals were in the range of 12.0mg/L to 4.0mg/L where the BIS limit is 150.00mg/L. Dissolved oxygen (DO) biochemical demand(BOD) and chemical oxygen demand (COD) recorded in the table were also indicate that water is in the safe zone of human consumption. Sodium content were 90mg/L to 176mg/L as per WHO reference water having more than 200mg/L sodium content is not suitable for human consumption. However 100mg/L sodium is ideal for human use as drinking water. Work is on progress for the study of Arsenic and fluoride contamination in underground water of some villages in Bhagalpur district

VII. Conclusion

In totality this study concludes that water and its quality, purity and abundance is highly variable with change in geography and depth surrounding soil is also the deciding parameter. Some of the parameters are close to BIS limit where as in some cases it was above BIS limit and that needs bringing down at the earliest. From hydrology map of the nation it is pleasure fo me that Bihar belong to safe zone of drinking water contamination. However in North- East Bihar as located below



But states like Punjab, Rajasthan, Gujrat, Telangana, Tamil Naidu need special precaution to be taken. At last it is very much unfortunate part for our nation where milk were abundant is moving fastly towards drinkable water scarcity all such happanes due to uncontrolled pollutions of even sacred river Ganga, Jamuna etc due to unplanned industrialization, massdefone tiny, From our ancient scriptures and testaments it reveals that river Sarswati has disappeared from our national map, but recent satellite piectures shows it was used to originate from Himalaya and moving towards Arabian sea carrying best quality of non polluted water being used in Vedic period as good as divine water 'Amrita'

Recently it has come to know that WATER ATM were installed in Delhi like Money ATM. The recent steps taken by present Narendra Modi government to make Ganga & other river clean may disparage the drinkable water scarcity we may hope so. Bihar has minimum organised & regular water supply system in rural areas where arsenic and fluoride contamination has rung the danger belt particularly in ground water resource strength should be added to testing labs to provide quick & better response.The prominence of wter inancient India may be visualized from the saying Vedass in which Indra, who is greatest of all Gods in Rig Veda and to whose adulation 1028 Slokas are devoted is called the "liberator of waters" or king of all God. Realising the importance of water/Rain its purity and distribution Indra was declared as the Supreme authority of Rain. Hence where pure water dwells there God dwells.

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