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GROUND WATER QUALITY IN RAJASTHAN AND MANAGING WATER SUPPLIES

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ABSTRACT

In over 90% of the cases, ground water constitutes the only source for domestic, industrial and even irrigation water supplies in the State of Rajasthan, India. Since chemical quality of the ground water determines its use, an intensive chemical quality survey of the ground water for the entire State was carried out. The data so obtained were processed and chemical contour plans indicating TDS, chlorides, florides, Nitrates etc. were plotted, quality potential maps prepared and Master Plans for water supply for all the villages and Towns framed.

The prolific growth of industries and population has resulted in indiscreminate discharge of waste waters, giving rise to deterioration of the quality of ground water. Public & Government attention is engaged. All out measures have been initiated to contain this.

INTRODUCTION

The State of Rajasthan covers an area of 342,214 square Kilometers and according to the 1971 census has a population of 21,222,045 souls spread out in 33,305 villages and another (These have since significantly increased) 4,543,761 in 157 towns. It is thus the second largest State of India area-wise and 10th population-wise The population density ranges from 184 to 4 persons per square kilometer from the rich areas of Alwar and Bharatpur districts to those of the arid ones of Barmer and Jaisalmer. It forms the North-West part of the country boarding Pakistan and includes the great expanse of the famous "THAR DESERT", the worst in India. The State is characterised by extremes of climatic conditions with rainfall, temperatures, depth of water table as well as the water quality varying widely, making domestic and other water supply problems really difficult and serious. Except for a couple of rivers in the South-East region, major part of Rajasthan suffers from arid and desert conditions. To make matters worse, famine befalls every second or third year, leaving no alternative for the inhabitants but to migrate to neighbouting States along with their cattle in search of good, fodder and water. Rainfall being scanty

and uncertain, ground water forms over 90% of the water supply source. The quality of the ground water, however, varies widely from region to region.

ASSESSMENT OF GROUND WATER QUALITY

Since the chemical quality of ground water determines its use, extensive and intensive surveys were under-taken to determine the chemical characterisics of ground water. The Public Health Engineering Department of the State carried out these surveys collecting water samples (with optimised sampling programme) for chemical analysis from all important wells of each of the 33,305 habitated villages spread throughout the State. These water samples were chemically analysed, primarily from drinking water point of views and such important parameters as total disolved solids (T.D.S.), chlorides, fluorides, nitrates hardness, P.H. etc. were determined. Simultaneous surveys for guniea Worm infestation and quantity assessment were also carried out. The results were interpreted in relation to chemical quality standards guide-lines laid down by the Govt. of India and adjusted by the State Public Health Engineering Department to practical considerations of availability and the past use practices. Thereafter, chemical contour maps showing such parameters as T.D.S., chlorides, fluorides nitrates etc. were prepared reflecting the chemical characterstic of ground water. These data alongwith those of the quantity potential indicating zones are forming the basis for planning water supplies in the State.

The following table* summaries the drinking water supply problems of all the 26 districts of the State of Rajasthan based on the above survey and chemical analysis. Three plans indicating contours of T.D.S., chlorides and fluorides in respect of Ajmer district (as samples) are accompanying seperately.(for poster presentation).

* The table shown on page no.5.

INVASION ON THE NATURAL QUALITY OF GROUND WATER.

The State of Rajasthan is relatively less advanced and industralised compared to many States of developing India. All the same, industrialisation is picking up. The bigger impact is due to prolific population growth. The total population has already crossed the 30 million mark. The number of towns has increased from 157 in 1971 to 184 by now, beside their growing in size. Sewerage systems are coming up in the bigger-towns like Jaipur, Jodhpur, Bikaner, Udaipur, Kota etc. Initially, the raw seweage was being discharged on the land for irrigation. This not only made the land sewage sick but also spread related diseases (Jaipur being the biggest consumer of Anti-worm medicines) and polluted the ground water making it totally unfit for use. Typical example is that of the area around north and south zone sewage farm sites of Jaipur-town. The waste discharges from the big and small industries of Kota town is resulting in increasing pollution of Chambal river which is further manifested in the deteriorating quality of the well waters on either

flank of the river. The extensive use of fertilizers and pesticides in the commanded area of Chambal irrigation system has caused further deterioration of the chemical quality of the adjoining ground water due to leaching and return flows. Likewise, the waste waters from the Khetri cooper complex have degraded the Kantli river flow, in turn deteriorating not only the agriculture wells but also the water supply wells of Singana village so much so that those wells had to be abondoned and new ones dug up stream of the waste discharge point. Then again, the effluents from the industrial estate factories and dying and printing industries of Pali town have severely spoiled the chemical quality of the adjoining Bandi river water for many miles on the down-stream affecting consequently the well waters on either flank. In the overall, we are the culprits as well as the victims.

STEPS TOWARDS IMPROVEMENTS

This drew the attention of the Public and the State Govt. alike. As a result of the mounting pressures, the Rajasthan State Water Pollution Control Board was established and Water Pollution Control bill enacted in the year 1974. Survey of the offending industries has been initiated the chemical characterstics of the effluents have been determined. As a result, information whenever required, is available regarding conditions of the waters of the major rivers. The Central Board for Prevenition and Control of Water Pollution has prepared a programme called "Protection of Drinking Water Resources" with a view to identify major waste water drainsto be treated before they are discharged into the rivers. The factories have been advised and counselled to improve the quality of their waste discharges and are being persuaded to setup waste treatment plants whereever required. The costs workout to around 2-3% of the capital investment of the industry. Penal and legal actions await those who prefer to disregard the advice. Water quality standards both for the effluents and the consequent receiving water bodies have been framed and are being enforced. Domestic waste water treatment plant has been constructed and commissioned for North-Zone-Jaipur resulting in marked improvement of surroundings. That for the South-Zone is proposed in the near future. To guard against the wardoff the ileffects, Municipal and Rural Water Supply sources managed by the State have been instructed to be sampled every six months and subjected to chemical analysis with a view to compare with the past results and assess the change in the quality of the ground water. Like-wise, a waste treatment plant at an estimated cost of Rs.23.5 million ($ 3 million) is proposed for immediate execution. Monitoring and surveillance of the waste waters, the receiving waters as well as the adjoining ground waters have been taken up. All out efforts are on. An integrated approach towards water supply and sanitation is aimed at. Over all management of the ground water is in hand.

Beside, the Central and State Water Pollution Control Boards, Environmental Boards have been set up in each State with, again, an apex body at the Centre. The Chairman of the Boards are the Chief Ministers of the respective States. In this drinking Water Supply and sanitation decade which is already on, it is hoped, a lot will be done to correct and improve the State of affairs.

REFERENCE

M.S. Kachwaha, "Master Planning Water Supplies for Rajasthan".

TABLE: Districtwise & Problemwise Breakup of Total Problem.

Districts	Category-I.		Category-II		Category-III		Category-IV		Category-V		Category-VI		T O T A L	
	(V)	(P)	(V)	(P)	(V)	(P)	(V)	(P)	(V)	(P)	(V)	(P)	(V)	(P)
Ajmer	118	0.87	360	2.28	102	0.77	55	1.08	235	1.77	84	0.39	954	7.16
Alwar	329	2.22	344	2.44	-	-	270	2.05	308	2.09	618	3.84	1869	12.64
Banswara	17	0.10	55	8.80	1367	5.31	-	-	-	-	-	-	1439	6.21
Barmer	611	4.29	45	0.45	34	0.25	266	1.37	66	0.65	15	0.18	837	7.19
Bharatpur	436	2.83	475	2.80	-	-	53	1.37	361	2.02	543	8.83	1868	12.85
Bhilwara	141	0.70	605	2.90	11	0.06	51	1.90	343	2.18	357	1.65	1508	9.39
Bikaner	330	1.72	14	0.06	1	0.01	80	1.14	40	0.31	75	0.12	540	3.36
Bundi	52	0.26	178	0.65	146	0.78	98	0.52	92	0.49	163	1.13	729	3.83
Chittor	140	0.45	50	0.25	228	0.73	202	1.94	212	0.86	1291	4.24	2123	8.47
Churu	540	3.88	32	0.23	20	0.14	107	1.00	73	0.59	78	0.32	850	6.16
Dungarpur	20	0.13	70	0.84	734	4.00	-	-	1	0.02	-	-	825	4.99
Ganganagar	1340	6.66	230	1.10	-	-	109	1.66	-	-	707	2.22	2386	11.64
Jaipur	443	2.87	595	3.03	-	-	837	5.20	385	2.30	423	3.97	2683	17.37
Jaisalmer	158	0.77	18	0.06	19	0.04	34	0.16	45	0.28	158	0.11	432	1.42
Jalore	343	3.43	85	0.67	16	0.08	60	1.28	58	0.72	33	0.29	595	6.38
Jhalawar	41	0.21	47	0.37	400	1.34	17	0.56	82	0.32	854	2.83	1441	5.63
Jhunjhunu	135	1.41	225	2.60	-	-	303	3.08	16	0.37	14	0.21	693	7.67
Jodhpur	351	3.32	31	0.40	93	0.94	141	2.07	82	1.07	4	0.05	702	7.85
Kota	39	0.18	69	0.33	175	0.80	53	1.45	154	0.70	1415	5.23	1905	8.69
Nagaur	557	4.16	363	2.85	91	0.99	107	2.06	76	0.66	22	0.35	1216	11.07
Pali	245	1.34	122	1.33	39	0.30	168	2.97	54	0.63	196	1.55	824	8.62
S.Madhopur	184	1.31	578	2.16	32	0.30	171	1.92	200	1.37	366	0.45	1531	10.51
Sikar	143	1.50	225	2.00	10	0.11	69	2.19	180	1.43	183	1.42	810	8.65
Sirohi	81	0.53	244	1.93	-	-	25	0.62	48	0.28	25	0.12	423	3.48
Tonk	140	0.87	216	1.00	8	0.04	64	0.68	195	0.96	383	1.62	1006	5.17
Udaipur	265	0.82	715	2.50	362	1.66	80	3.04	433	2.28	1261	5.49	3116	15.82
Total :	7199	47.24	5991	36.03	3888	18.68	3220	41.31	3739	24.35	9268	44.61	33305	212.22

Explaination: Category-I. No source & Brakish villages (where TDS > 2000 PPM. Category-II. Villages having throrides > 1.5 PPM. Category-III. Villages affected with guniea worm diseases. Category-IV. Difficult & inadequate villages i.e. where water is available at a depth more than 20 M or where vertical/downhill travel is more than 100 M. Category.V. Brakish villages where TDS between 2000 - 1000 PPM & chlorides 1000 - 500 PPM. Category.VI. No problem villages.
V = This column indicates number of villages. P = This column indicates No. of population in thousand.