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A K Biswas and others

Coastal zone water supply schemes - West Bengal



INTRODUCTION

In line with the United Nations goal for providing potable drinking water and effective sanitation for all, a decade programme has been undertaken by various Government of the world. India is actively participating in this programme. West Bengal being an enlightened state has drawn her own programme of work relating to decade activities. Factually the state Government was so much seized with the water supply problems of the Rural areas, they embarked upon a scheme of Accelerated Rural water supply in West Bengal since 1977-78. Of the many facet of such work the programme relating to Coastal Zone (which is predominantly saline) is taken into considerations in this paper. This paper deals mostly with the evaluation of Rural Water Supply Schemes of the Coastal Area, District Midnapore with Special relevance to quality of water, quantity, health status, socio-economic condition of the villages located within the area.

OBJECTIVE

The immediate objective was to assess the water quality, made an evaluation of the existing gaps and inadequacies, and to recommend for effective implementation, operation and maintenance of the existing water supply schemes in the study villages so that benefit is maximised.

MATERIALS AND METHODS

Lurmut (population 2504) and Betalia (population 970) villages were selected as study villages (where organised piped water supply through public stand post exists) and Fauderchawk (population 387) was selected as a reference village (where there was no organised water supply system). The study period was for two years (1980 and 1981). Water samples were collected six times, once in each season, from all the three

above mentioned villages. All physico-chemical and bacteriological analysis of water samples were done as per APHA Standard method (1). Along with the quality analysis, engineering data and information on health status as well as quantity of water supply were collected to have a greater insight into the problem.

WATER SUPPLY AND HEALTH STATUS OF COASTAL AREA.

Essentially the coastal zone in and around Contai Municipality is extremely a saline zone. Surface water tapping and exploitation are also not suitable for potable water. To overcome such difficulties in one hand and simultaneously to provide adequate potable drinking water at the rate of 54 lpcd (12 gpcd) to 93,000 population (Projected population) the Public Health Engineering Directorate of West Bengal embarked upon digging deep tube wells (15.6 cm. diameter, 180 meter deep - 2 nos. in each of the five zones) from the sweet water zones about 10 km. away. Ground water from each zone is pumped to overhead reservoir (capacity 2,72,400 liters) with a staging height of 20 Meter and intermittent water supply is provided to the villagers. As per prevailing norms each stand post caters the water need of 250 people. Consumption of water in the study villages were observed to be 40 lpcd (8.8 gpcd). Water is distributed from overhead reservoir through public stand post which are fed by gravity flow, first through a 300 mm diameter C.I. Main and then through a 80 mm Diameter A.C. branch pipe. Normally water supply was seen to be provided for 2 hours in the morning and 2 hours in the evening. Overcrowding at the PSP'S was the main difficulty in fetching the water and this is followed by the distance that the villagers have to travel to get potable water. Water from PSP are mainly used by the

villagers for cooking and drinking purposes and the rest of activities are carried with water from shallow ponds. Even though about 70% population was literate, still it was observed that most of the villagers were not aware of hazards of waterborne and infectious diseases. Immunization practices to prevent certain waterborne diseases are almost non-existent. The problems get further aggravated because of power failure and low voltage and at that time reservoirs are empty, consequently PSP'S are non-functional. Under such conditions most of the people will resort to using shallow pond water even for

drinking and cooking purposes. Dysentery and Diarrhoea and worm infestation were common ailments in these villages. Compared to the study villages water quality of the reference village was observed to be worst from health status point of view.

RESULTS

Results of selected physico-chemical and Bacteriological parameters of the water sample collected and analysis both from study and reference villages are given in Table I.

TABLE I. Water quality of selected villages in COASTAL ZONES

Parameters	DURMUT		BETALIA		FAUDERCHAWK	
	Range	Ave- rage	Range	Ave- rage	Range	Ave- rage
ph	7.5-8.2	-	7.5-8.2	-	7.4-7.8	-
TDS	604-668	639	568-662	617	152-1264	384
T. ALKALINITY (CaCO ₃)	302-361	323	304-361	336	32-292	112
T. HARDNESS -do-	304-365	332	308-361	342	41-360	133
CARB HARDNESS -do-	302-361	323	304-361	336	32-292	112
NON-CARB HARDNESS -do-	2-24	9	0-14	7	2-80	32
CALCIUM -do-	147-190	170	160-190	175	22-165	65
MAGNESIUM -do-	136-177	160	140-194	166	21-149	59
CHLORIDES (Cl)	123-150	135	132-151	143	21-354	87
SULPHATES (SO ₄)	23.2-37.5	28.55	25.0-32.5	28.04	5.01-187	42
T. IRON (Fe)	0.08-0.42	0.168	0.04-0.13	0.11	0.22-3.44	1.63
RESIDUAL CHLORINE (Cl ₂)	Traces	-	Traces	-	N.A.	-
BACTERIOLOGICAL (MPN/100 ml)						
Coliforms	0-790	215	0-23	10	20-2400	1250
F. Coliforms	0-33	14	0-23	8	0-1700	680
E. Coli	0-13	4	0-4	1	0-490	320
F. Streptococci	0-13	5	0-4	1	0-330	159

(All values except pH are expressed in mg/l)

From the critical analysis of the data presented it could be observed that in both the study villages total dissolved solids of water was high and other parameters were more or less within the permissible limits. In the reference village, iron content was observed to be comparatively higher and the other parameters were well within the permissible limits. Bacteriologically water quality in both study villages and also in reference village were unsuitable as potable water. Total coliforms count in Betalia was observed to be 0-23 MPN/100 ml and that of Durmut was 0-790 MPN/100 ml. High total coliform count of 20-2400 MPN/100 ml. was observed in the reference village Faudarchawk. F. Coliforms, E. Coli, F. Streptococci, values of water analysis from reference village were much higher as compared to the corresponding values of study villages - Durmut and Betalia.

DISCUSSIONS

Along with water quality studies health status and water supply position of the study and reference villages were undertaken. In general villagers were quite responsive and respondent percentage varied from 68-84 where educational level was around 70%. Open air defecation was the common practice and 85-90% of the people were going into the field for easing themselves.

Aesthetic sense of the people was observed to be excellent and almost cent percent of the people will wash their hands after defecation and these 74-97% of the people were using mud to clean their hands after ablution.

In respect of health education it was noticed that the local people (25-30%) were ignorant about the adverse effect of drinking unsafe water.

Dysentery and diarrhoea were observed to be very much predominant and the morbidity rate was as high as 65-79%. The concept of immunization were poor and during illness only 17-30% of the people will go to Health Centre for treatment. The remaining majority will go to private medical practitioner for treatment under compelling circumstances.

Even though people were poor, still majority of them will prefer to call on private practitioner in preference to Primary Health Centre/Govt. Hospital. An enquiry into this situation revealed that the facilities at Govt. Institution could not be available by most of the people because of distance, non availability of medicine, Doctor and for other constraints. Cholera and typhoid inoculation ranged from 8-26% only. Polio, T.B. Vaccination of the Children were also observed to be very low. Other details on Health status and water supply are summarised in Table 2.

TABLE - 2. Some relevant data/Information on Health Status and water supply position of the concerned villages.
(All figures are in percentage unless or otherwise stated)

I T E M S	DURMUT	BETALIA	FAUDERCHAWK
1. Educational background of the respondent - Illiterate	25.4	30.2	30.4
2. Sullage is disposed off in			
- no organised system	76.2	63.5	78.3
- ordinary pit	11.2	6.3	17.4
- connected to drainage	17.5	-	-
3. Domestic garbage and refuse are disposed off			
- throwing around the house	38.1	22.3	39.2
- Pit in the house premises	34.9	34.9	21.8
4. Fingernails were observed to be properly cut and cleaned	46.1	44.5	30.5

TABLE - 2 (Contd.)

I T E M S	DURMUT	BETALIA	FAUDERCHAWK
5. People's knowledge about drinking unsafe water causing diseases is known to	66.7	73.1	69.6
6. Villagers knowledge on water borne diseases			
- Cholera/Gastroentitis	20.6	27.0	30.4
- Typhoid	12.7	7.9	21.7
- Dysentery/Diarrhoea	66.7	65.1	78.3
- Infectious hepatitis	4.8	-	13.1
7. Habit of the people is to take daily bath but its importance is attributed to			
- personal hygiene	38.1	42.9	17.4
- Freshness	73.1	53.9	82.6
8. Villagers believe that control of diseases by immunization is possible to the extent of	46.1	44.5	47.8
9. Recurrence of three types of waterborne diseases during last 3 years are reported by villagers to be			
- Dysentery/Diarrhoea	79.4	96.8	91.3
- worm infestation	76.2	88.9	78.4
- Typhoid	3.0	3.2	4.4
10. Reduction in illness after introduction of water supply to the extent for the following diseases (as reported by villagers)			
- Dysentery/Diarrhoea	47.6n	61.9	N.A.
- Typhoid	2.0	2.0	N.A.
- Cholera	23.8	7.9	N.A.
11. Quantity (in liters) of water obtained daily.			
- morning	24.2	30.9	N.A.
- evening	18.5	22.6	N.A.
12. Time (in minutes) spent in fetching water on an average			
- morning	50	50	N.A.
- evening	45	40	N.A.
13. Difficulties in fetching water is attributed to			
- over crowding	95.3	96.8	N.A.
- insufficient pressure	30.2	61.9	N.A.
- Distance too long	19.1	30.2	N.A.
14. Breakdowns in water supply is attributed to			
- Electricity	95.3	87.3	N.A.
- Machinery	15.9	4.3	N.A.
- Organisation	22.3	6.4	N.A.
15. Villagers fetch water during breakdown from			
- shallow pond	100.0	100.0	N.A.
16. Villagers attribute benefit of water supply to-			
- labour reduced in fetching water	49.2	82.5	N.A.
- more time available for work	31.7	60.4	N.A.
- reduction in illness	73.1	82.5	N.A.

(Forms only a part of questionnaire used during the study)

CONCLUSIONS

Taking the condition of these villages and other 83 villages spread over 11 States in India, NEERI recommended certain norms for percapita rate of water supply (lpcd) which is given a Table-3 (2).

TABLE 3. Recommended per-capita rate of supply (lpcd)

Description	House connections	Public stand-post/hand pump
Drinking	5	5
Cooking	3	3
Ablution	10	6
Bathing	20	15
Washing utensils and house	15	10
Washing of clothes	20	15
Flushing	8	6
	<u>81</u>	<u>60</u>
Leakage/wastage at 10%	8	6
	<u>89</u>	<u>66</u>
Say	90	70
Cattle need including leakage/wastage	20	20
	<u>110</u>	<u>90</u>

This norms may not be very suitable to all the villages in India but serves as a useful guide lines for future programming and to improve upon the condition of the existing one. Needless to mention that all the three villages mentioned above were getting inadequate water for their various uses. It is desirable that to improve upon the existing condition at least one PSP'S (with 2 taps) of "waste-not type" for every 150 persons be provided. Furthermore, supply be maintained at adequate rate (12 lpm per tap) at all the PSP'S for 2-3 hours in the morning and 1-2 hours in the evening at timing convenient to the consumers at least. The bacteriological water condition of the study villages can be improved upon by adopting effective chlorination and by constructing suitable platform with proper drainage arrangement at PSP'S. The competent authority should also ensure that ground water withdrawal and

pumping the same to overhead reservoir are not interrupted for failure of power, low voltage etc. If this is not taken due care off then the marginal benefits that have been offered will also not be meaningful. In order to make the scheme more effective, it is recommended that the following measures should be adopted.

- Community participation in water supply and sanitation programme should be encouraged so as to improve O & M at water supply system.
- The community has to be made aware of the benefits of environmental sanitation through a regular programme of health education and motivation.
- A programme for rural sanitation with a limited demonstration latrine programme should be undertaken immediately.

Unless and until water supply programme is matched with the appropriate sanitation practices, the health of the villagers are not likely to improve. Where possible arrangement may be made to provide water supply in the household at consumer cost and many of the villagers are willing to pay for it.

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