International water and sanitation decade, is it a dream or a reality?

8th WEDC Conference: Water and waste-engineering in Asia: MADRAS: 1982

INTERNATIONAL WATER AND SANITATION DECADE. IS IT A DREAM OR A REALITY?

by G SAGAR and V K AGARWAL

In the past great weight has been given to the safety of drinking water against disease and thus the piped water systems were recommended in general. In the succeeding paragraphs the author has made a comparative study of piped water supply, hand pumps and open wells. The age old belief that the piped water supplies are the safest is not true. The hand pump water is comparatively safer. As for the open wells, its water can be made quite safe with the use of a simple device known as pot chlorinator.

If the aim of the "International Water Decade" to provide safe water and sanitation to all the communities by the year 1990 is to be realised, the priorities will have to be redefined and we should take up chlorination of village wells in a big way. Secondly, we should give preference to hand pump and sanitary dug well schemes over piped water supplies which are very costly. Thirdly, we must also insist on drainage around the wells and hand pumps. Fourthly, carry out a programme of health education paralled with the development of community water supply and sanitation in order to highten people's awareness with respect to health, seeking their full support in planning, operation, maintenance and financing of the above services. And lastly but not the least, develop appropriate technologies in the context of existing socioeconomic conditions.

STATUS OF WATER SUPPLY & SANITATION IN UTTAR PRADESH

The progress with regard to the provision of drinking water in rural areas of Uttar Pradesh is quite slow. This is mainly because of our decision to extend only the piped water systems for safe water. Till March, 1980 only 10,056 (Ref.1) villages could be covered out of total number of 112,624. As regards rural sanitation practically nothing has been done so far. The requirement of funds to cover just 50,000 villages with piped water supply works out to Rs. 1600 crores (Ref.2) (1£ = Rs. 17.50), proposed to be spent in the "International Water and Sanitation Decade" (1981-90). A provision of Rs. 120 crores has been kept under 'sanitation'. But the availability of such huge sums is a big question. In the central sector provision of only Rs. 88 crores (Ref.3) exists for rural water supply in Uttar Pradesh for VI Five Year Plan (1978-83). With water supply largely covered, the sanitation is lagging behind in the urban areas. If our aim is to achieve 100% of water supply and sanitation coverage, conventional technology will have to be replaced with more appropriate systems.

WATER QUALITY

Tap water is regarded as being better than hand pumps and open wells. The argument which is generally put forward is that open wells are subjected to contamination even when sanitary protection is given. This is because the dirty rope and bucket that goes inside the well can impair the bacterial quality of water. As regards the hand pumps, many public health engineers hold the view that they usually draw water from the first layer of acquifer which is generally polluted.

PIPED WATER

It flows through a closed system and draws water from deep acquifers, or after proper treatment in case of surface waters, and so it should be safe. But it is not true in general; below are the recent finding (Ref.4) from two prestigious water works A and B. These water works supply water from deep tube wells as well as from the river after treatment. Water samples were drawn from the distribution network in September 1980 and January 1981 respectively. In water works A, 222 samples were examined out of which only 10 samples (4.5%) contained residual chlorine. Number of samples falling within excellent and satisfactory ranges were 154 (70%). Total number of unsatisfactory samples reported were 60 (27%). The remaining 8 (3%) samples fall in suspicious category. In water works B where efforts were made to carry out E-coli test as well, the situation was still worse. Out of a total of 182 samples examined, only 15 samples (8%) contained residual chlorine. Samples up to satisfactory limit reported were 117 (64%) whereas unsatisfactory samples were as high as 52 (29%). The remaining 13 samples (7%) fall in suspicious category.

38 samples (21%) contained E-coli that confirms feacal contamination. If these results are examined in the background of the Water Supply Manual, (Ref.5) it would be seen that the bacterial quality of water obtained from these water works is highly unsatisfactory. According to the recommended norms 100% of the samples should have residual chlorine of minimum 0.2mg/l.; no sample obtained should be unsatisfactory and at the same time all samples should be E-coli free. If this is the state of affairs it may be pointed out that piped water systems are also liable to high degree of contamination. Mara (Ref.6) writes: "Some economists argue that a piped supply of water is beneficial, irrespective of its quality. Yet there is evidence that intestinal disease has increased after untreated rural water supplies have been installed". Unfortunately, supplies drawn even from the purest source such as a deep tube well get contaminated during conveyance in the pipeline. This is mainly because of the leaky joints and the intermittent nature of water supply sucking in untreated water during sudden interruption in the water supply.

HAND PUMPS

In the case of hand pumps, water gets percolated to deeper soil layers and thus gets filtered. Safe water can be drawn even from the first layer of acquifer if some minor precautions are taken (Ref.7). These are: where sub soil water is subjected to direct contamination such as from the open wells or the bore hole latrines where the bottom of the bore hole penetrates the sub soil water level, a minimum distance of 7.5 metres should be kept from the source. Sanitary protection should be provided consisting of puddle clay lining around the pipe in the top 1.5 metres, with the surrounding soil carefully repacked. A pucca platform should also be provided round the hand pumps. In addition drainage should be provided. This should consist of a soakage pit located at a minimum distance of one metre from the hand pump. A minimum cushion of one metre should be kept between bottom of the soak pit and sub soil water level; a platform may be raised and a soak trench may be provided instead of a pit. Where some sort of drainage system exists a drain connection may be provided. In non porous soils, underground drainage may be laid consisting of small bore sewers (Ref.8). This could be more effective and should precede piped water supply.

In village Attari, block Mal, district Lucknow, water samples were tested from 12 hand pumps (appendix A).

It may be seen that water from 6 hand pumps is excellent and the remaining 6 are unsatisfactory. The author had occasion to inspect them and found that unsatisfactory quality of water was mainly due to the direct contamination occurring through the annular opening in between the casing pipe and the bore hole in the absence of proper sanitary protection discussed earlier.

On Feb. 27, 1981, author learned from Mr. A.K. Poddar, Chief Engineer, Public Health Engineering Department, West Bengal, that many people in Calcutta are using only hand pump water for drinking while the water supplied by the Calcutta Corporation is being used for other purposes. Thus it may be concluded that hand pump water can be safer than that usually supplied.

OPEN WELLS

Next comes the question of open wells. No doubt these wells are subjected to high contamination through the unprotected rope and bucket system. However, the experiments (Ref.9.) conducted by the U.P.Jal Nigam with the pot chlorinator have shown that with the disinfection of the well water, safe water supply can be achieved in even such cases where adequate measures for drainage and sanitary protection of wells do not exist. Out of 61 water samples examined where the pot chlorinators were suspended in wells, in village Kanchanpur-Matiyari, 55 samples (90%) were found up to satisfactory limits and the remaining 6 samples (10%) were classified as suspicious. However, no sample was found unsatisfactory after chlorination. Residual chlorine was present in well water at all times. Improved pot chlorinators developed as a result of further experimentation in UNICEF assisted 'Mall Sanitation Project' Lucknow, can provide effective chlorination for 60-80 days.

In the plains of Uttar Pradesh the cost of piped water systems varies from Rs. 200 to Rs. 250 per capita, on present population. In the hard-rock and mountainous regions it may cost Rs. 400 to Rs. 600. This does not however include the cost of waste water disposal system. For hand pumps the cost varies from Rs. 15 to Rs. 25 for plains, and Rs. 50 to Rs. 100 for hard rock areas including the drainage facility. The cost has been worked out for 200 people per hand pump. The capital cost of a pot chlorinator programme is negligible. Considering 100% grant for construction, the maintenance cost of a piped water system works out to something like Rs. 7.50 per household per month. In case of hand pumps Rs. 0.50 to Rs. 2.00 per household per month

have been reported based on a three tier system of maintenance. For a pot chlorinator programme the cost per household per month may vary from Rs. 1.00 to Rs. 2.00 only.

Uttar Pradesh is the only state that enjoys the legacy of the piped water system. Other states have switched over to hand pump and sanitary dug well construction programme much earlier. Orissa has almost completed the first priority scarcity villages in this way and other states are also much ahead including Bihar and West Bengal.

INTERNATIONAL WATER DECADE

If in the International Water Decade our aim is to provide safe water and its sanitary disposal for all the communities, our priorities need to be re-defined. In the first instance, pot chlorinators should be put in all the existing open wells and spring collecting chambers. In the second place, preference should be given to hand pumps and sanitary dug wells particularly in the rural areas. "Piped Water Supply Schemes are costly (Ref.3) and would be adopted only when less expensive measures such as hand pumps and sanitary dug wells are impracticable on account of geographical and terrain condition" as stated in the VI Draft Five Year Plan 1978-83.

APPROPRIATE TECHNOLOGY

India is a vast country with varying culture and topographical features. More practical low-cost, labour intensive, self reliant technologies with emphasis on maximum use of local resources - both material and labour - need to be evolved. Our technology policy (Ref.10) should largely dwell upon these considerations.

HEALTH EDUCATION

Much has been said about health education (Ref.11) and human motivation but not all is practised in the field. In the International Water Decade this has to be persued vigorously. Public opinion should be mobilized regarding the provision of basic water supply and sanitary services and developing appropriate procedures to ensure active participation of the communities in the programme.

ACKNOWLEDGEMENT

Views expressed in this paper are the author's own and need not necessarily be of the U.P. Jal Nigam. I am grateful to Mr. S.K. Sharma, Additional Chief Engineer, U.P. Jal Nigam, Lucknow for his inspiring guidance and permission to publish this paper.

REFERENCES

1. Targets and Achievements April 1980, U.P. Jal Nigam.

2. State has a Big Water Plan. Northern India Patrika, dated 10-8-80.

3. Norms for Rural Water Supply - B.B. Rau and M.M. Dutta, pub. in Water World, January - March 1980.

4. Report of the State Hygiene Inst. Lucknow January 1981.

5. Manual on water supply and treatment, CPHEEO, Ministry of Works and Housing, New Delhi, 1976.

6. Bacteriology for sanitary engineers, D.D. Mara, 1974.

7. Bacterial Contamination of water Mains, Gyan Sagar, pub. and presented in the Seminar Institution of Engineers (India) Jan. 1-3, 1978, Gorakhpur, U.P.

8. Appropriate technology for water supply and sanitation. Technical and economic options, John M. Kalbermatten, De Anne S Julius and Charles G. Gunnerson, World Bank/Dec. 1980.

9. Safe water for millions, Gyan Sagar, published in the Civic Affairs, May 1980.

10. An approach to technology policy for the nation - Gyan Sagar, Civic Affairs June, 1980.

11a New approach to planning of rural water supply - published by the Inst. of Engineers (India) PH Division Vol. 51, No. 6 part 2, Feb. 1971., G. Sagar.

11b Social Criteria in the design of rural water supply projects - pub. by Society for Training and Development Journal, New Delhi, Oct. 1979. G. Sagar.

11c Towards Sound Management of Rural Water Supply, Pub. in Prabandh, Lucknow, Jan-March, 1980. G. Sagar.

Code No.	

APPENDIX A

STATE HEALTH INSTITUTE, UTTAR PRADESH, LUCKNOW

Result of bacteriological examination of water sample which were received from co-ordinator, P.R.A.I. Scheme, Atari, Block Mall, District Lucknow.

Sl. No.	Date of collection.	Date of receipt and inocutation.	Source of water (Hand Pump)	Colony Count on Agar 48 hrs | 72 hrs At 37° Room Temp		Presemptive Coliform Count Quantity of sample in each T. T.	50 ml.	10 ml.	1 ml.	0.1 ml.	Probable no. of Coliform organism.	Mg./l. free residual chlorine.	Remarks.
						No. of Test tube	1	5	5	5			
408/D	—	8-10-80	H.P. of Raja Balbir Singh, Atari.	10	15	—	0	0	0	—	0	No	Excelent.
409/D	7-10-80	8-10-80	H.P. of Pt. Siya Ram, Atari.	Innumerable		—	1	5	1	—	35	No	Unsatisfactory.
410/D	7-10-80	8-10-80	H.P. of Raja Ram, S/o Sakhi.	13	20	—	0	0	0	—	0	No	Excelent.
411/D	7-10-80	8-10-80	H.P. of Kallu Yadav, Atari.	Innumerable		—	1/0	5/0	5/0	—	180	No	Unsatisfactory.
412/D	7-10-80	8-10-80	H.P. Pt. Ram Shanker S/o. Badri Prasad. Atari	Innnmerable		—	1/0	5/0	5	—	180	No	Unsatisfactory.
413/D	7-10-80	8-10-80	H.P. of Maiku, Atari.	Innumerable		—	1	5	5	—	180	No	Unsatisfactory.
414/D	7-10-80	8-10-80	H.P. of Madari Yadav, S/o Thani, Atari.	Innumerable		—	1/0	5/0	4	—	160	No	Unsatisfactory.
415/D	7-10-80	8-10-80	H.P. of Siya Ram, S/o. Raja Ram, Atari	10	15	—	0	0	0	—	0	No	Excellent.
416/D	7-10-80	8-10-80	H.P. Niranjan, Atari	10	16	—	0	0	0	—	0	No	Excellent.
417/D	7-10-80	8-10-80	H.P. of Munni Lal S/o Sakhi, Atari	9	14	—	0	0	0	—	0	No	Excellent.
418/D	7-10-80	8-10-80	H.P. of Ramchandra S/o Sakhi. Atari.	Innumerable		—	1/0	5/0	5	—	180	No	Unsatisfactory.
419/D	7-10-80	8-10-80	H. P. of Shivmurti S/o Kanhyalal, Atari.	12	18	—	0	0	0	—	0	No	Excelent.