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Technology and Social Behaviour in Hand Pump Programmes for Rural Drinking Water Supply—The Widening Communication Gap

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Natural calamaties keep on claiming sizeable chunk of human resources of our society. Draught is one of the important components of this process. With his rich practical experience the author has made an attempt to highlight human aspect of misery minimisation. A case has been made to emphasise the need for educating the users and professionals. There is urgent need to plan for communication support for making this national effort a success.

The Indian drought of 1967, widely known as Bihar drought, happens to be a distinct land mark in the history of rural drinking water supply. This was the occasion when a new generation of man and machinery invaded the rural scene for displaying a set of ingredients unknown to its beneficiaries thus far, to fight against the drinking water shortage.

We have come a long way after 1967. Following Bihar drought there had been in a sequence several other drought events substantiated with similar relief type operations in various states including Bihar—the home ground for the drought. Yet, handpumps in drinking water wells stand in the rural areas without any commitments to provide reliable safe drinking water for the community. Meanwhile, drought seems to have institutionalised itself in the name of 'International Drinking Water and Sanitation Decade' of the U.N. in which India happens to be a signatory.

The new device, the tubewell brought along a set of tools—the hand pump and the drilling machines to name a few. These were like miracle boxes and were being employed during the following years by a group of multi-disciplinary professionals who had merely some partial knowledge of the subjects and tools they have been handling though in some other context.

Improper Device—Hangover of the Past

During the drought of 1967, in Bihar, there existed tremendous confusion regarding the use of hand pumps. Diamond drilling machines were summoned which were just not the devices to help the occasion. Water (the ground water) has always caused problems in the progress of such drilling techniques. Drillers, most of whom came from the mineral exploration organisations like the Geological Survey of India (GSI) and the State Government Departments of Mines and Geology, out of their ignorance went on closing the fractures that were absorbing all the drilling water (or the *drilling gel*—this is injected from the surface to clean the drill cutting) just out of their eagerness to attain drilling deeper and deeper. The ultimate result was the production of dry bores.

The dry bores fitted with hand pumps resulted in people 'mishandling' them. People were naturally angry at this mockery though things were not clear by that time either to the people or to the professionals—who were rendering their bit in order to determine as to where lies the fault. Was it the bore that was dry or was it the pump that was not capable of drawing water? At some other locations where pneumatic blast-hole drills (later to be known as down-the-hole-DIH hammer drills) were employed, the water was visible. Often it soiled all the onlookers by its intermittent 'flush' of muddy water gradually grading into transparency. It created merry moments in the drought stricken villagers and the newspapers carried impressive photographs of villagers bathing near the drilling machine boring a hole which was yet to be commissioned as a water well.

Each pump had to be repaired frequently, at times 19-20 times within a span of 3-4 weeks. Soon it was discovered that the pumps were not sturdy enough for the community handling. Children playing and eventually breaking them was an alarmingly common feature. Often domestic buffaloes and bulls did the job. By and by, the commercial hand pumps lost their credibility and by 1972-73 when Maharashtra was passing through another spell of severe drought, the local voluntary organisations had come out with a sturdy hand pump by the name of *JALVAD*. Two closely related, closely situated voluntary organisations each located respectively at Jalna (WAR ON WANT) and Vadala (M.M. Water Development and Mechanical Training)—Ahmednagar District, had been responsible for designing and producing it. This pump was later modified as 'Sholapur' model and the yet later model of India Mark II, which became extremely popular throughout India are most identical due to their genetical relationships.

Having won the major battle of hand pumps with the help of India Mark II, which is strong and sturdy enough to sustain community handling, it was

apparent that the programme of rural water supply should have gone rather smoothly. The real situation however, does not support this view.

Whose Tubewell?

Table 1 indicates the status of utilisation of hand-pumps in 3 neighbouring districts. In the district of Purulia where the programme is running for 5 years, the number of break-downs (in a given time) are more than the other areas (for example Keonjhor where programme has just completed) because the India Mark II pumps generally give trouble free service for about a year. Again in Purulia out of 43 wells, frequent breakdowns and infrequent breakdowns were noticed in 16 borewells each, whereas 9 borewells reported no breakdowns. A point worth noting here is that out of 43 wells, 13 and 24 wells were drilled during the years 1978 and 1979 respectively and the following was the response to its repairs which is exclusively carried out by PHED crew (Table II).

Table 1. Condition of hand pumps and the tube wells in three neighbouring districts*

	Period of operation	Tubewells		Pump condition		
		Total commissioned	Sampled	Good	Out of order	Unsatisfactory
Mayurbhanj (Orissa)	1980-82	187	47	36	8	3
Keonjhor (Orissa)	1981	14	5	5	—	—
Purulia (West Bengal)	1977-82		43	29	12	2

*Samples from work done by Lutheran World Service, Calcutta surveyed in April 1982.

Table 2.

Time taken for repairs	No. of cases
Duration	
7-15 days	14
1-2 months	3
More than 2 months	12
Not applicable	11
No information	3
Total	43

The situation in Mayurbhanj is yet to show up since here the oldest bores were commissioned during 1980, but even here, out of 42 wells sampled, 8 sites had breakdowns with one well showing frequent breakdowns. The

repair of these took 20 days to 2 months, while 2 of the pumps were not repaired for more than 6 months time.

The situation has developed clearly because of the centralised approach of the three tier infrastructure for the hand-pump maintenance which is being pushed through a strong UNICEF backing. The three tier system consists of a village level caretaker, a block level team for minor repairs and a district level superteam for major repairs and spare supply. This district level (3 tier) maintenance system rather threatens to jeopardise the entire self-help attitude instead of allowing the 'system' to work. By and large, the rural people are developing the tendency to believe that the tubewell installed in their village belongs to the Government of PHED and though they are the users they indeed have no responsibility of repairing it.

Unreached Villages

The objective of the Drinking Water and Sanitation Decade is to provide at least one safe drinking water source within a distance of 1 mile (1.6 kms). Although a water source could mean any thing from a dugwell spring or open pond the emphasis presently rests on the drilling rig and the hand pumps. If in a map of India of the size of a 70 mm screen (in cartographic terms this should mean a map of 1:1000,000 scale) each of the well points were marked by a small blue dot in the entire country would look as blue as the Bay of Bengal. But a number of villages that could perhaps be marked in the map with precise accuracy, could not be reached with a drilling rig mounted on the heavy truck. Table 3 gives an account of the reached and unreached villages under a planned programme in the district of Mayurbhanj, Orissa. This situation is despite of the fact that both PHED and the voluntary agency has been in operation in the district for over a year.

Table 3. The list of scarcity villages reached and unreached in Mayurbhanj district, Orissa

		Vol. agency programme		PHED programme		
Name of the block	Total no. of scarcity villages	No. of villages covered	No. of handpumps installed	No. of villaged covered	No. of handpumps installed	No. of villages not covered
1	2	3	4	5	6	7
Jamda	73	33	57	37	44	12 (16%)
Bahalda	97	23	31	30	93	57 (58%)
Tiring	80	27	30	58	125	13 (16%)
Bijatola	129	19	30	12	25	99 (77%)

The figure in column (2) is not equal to the total of column (3)+(5)+(7) becuase the voluntary agency and the PHED had worked in common villages. The example of 4 blocks of Mayurbhanj district should be at least indicative of the gravity of the problem we are advancing to tackle with only one type of drilling rig in the hard rock areas—which forms almost the entire peninsular region of Ganga-Brahmaputra plains.

Now taking the country as a whole, if drinking water is to be brought within the reach of people—the total number of tubewells to be installed is roughly 3,000,000 which should take about 30,000 machine years to complete. This implies that a regiment of 3000 fast mechanical drilling units must work continuously for 10 years to fulfil the task.

Now, if the requirement of machine is projected taking the irrigation needs into account the figure should be five to ten times higher. Obviously, the magnitude and the dimensions of the problem is such that the actions should be self-generating, economically speaking, and therefore, decentralized approach would perhaps be more appropriate rather than the imposed centralized programmes those are in vogue.

The Communication Gap

A number of questions emerge in the minds of the planners, administrators and operators of a drilling programme and these persist throughout the period of operation. For example, before the machine reaches a work site, the question may often be asked as to:

—What could be the depth of drilling?
—What (formations) are going to be encountered?
—How much water is expected?

and after the completion of the well it is often necessary to know that:

—Is the well going to support water supply on a long term basis?
—What should be the depth, capacity and make of the pump to be installed?
—What is the quality of water suitable for drinking and is it well protected from pollution threats?

These questions imply involvement of various functionaries at different levels who would obviously not be under one idealized umbrella to augment smooth operation of the programme. From village level workers to the national level planners it involves various agencies which in turn would include various sections of multidisciplinary scientists and technicians. There is the obvious difference in the knowledge level among the total cross section of involved groups and individuals. In the actual programme,

various range of experts would take part starting from qualified geologists and engineers, to barefootians like water diviners and hand boring masters. Obviously their deployment would be in accordance with the priorities that develop and the available expertise at various stages and levels of the programme. The entire communication gap relating to drinking water programme can be broadly identified at two levels. Firstly, the communication gap within the system (establishment) handled by multidisciplinary professionals who carry out policy making/planning and implementation and secondly, the communication gap between the rural mass and the professionals.

There is a kind of mystry surrounding the occurrence and movement of groundwater and therefore in the total approach of selecting a well site to hand pump installation, professionals play a major role. Presently, dissemination of knowledge within the level of professionals is being considered but this may be with a determination. A part of the useful knowledge must percolate upto the level of the users. The people must not always treat the system from a distance due to the mystry that surrounds the total ambit of technology. The demistification is utmost necessary and it can be brought about it in the following ways:

(*i*) by promoting the slow labour intensive devices which may also be duly modified. This will provide adequate opportunities for the members of rural community to actually take part in the operation,

(*ii*) by creating local village level teams for repair and maintenance of pump. This can be derived out of the above exposure,

(*iii*) by disseminating the basic knowledge of groundwater occurrence (as may be appropriate to the area) and hand pump mechanism and also about the aspects of water resources and the sanitary protection of water,

(*iv*) by allowing the villagers to act with the tubewell like making a channel to save the village road from getting wet, using the water for vegetable gardening, organising the people to collect water in a disciplined manner etc.

These measures, to some extent, will help people understand the situation and adopt the new alternative drinking water system from within.

The authors of drinking water decade must realise the fact that the tubewell is yet to prove itself to be the workable alternative to the existing dug wells which are versatile enough to serve under various situations despite of their weaknesses (in terms of depleting water level rendering it to go dry and the lack of protection against faecal or bacterial contamination) they have the strength to serve. This basic strength of dug well must be translated to the system of tubewells as well in order that it works.

Communication plays a big role in bringing the technology and its interwoven components to the level of a remote village. Keeping in mind the fact that the majority of the beneficiaries would be unexposed to modern way of life. The basic strength of the dug well is that it has successfully and parenneally reached the level of a remote Indian village with its whole technological parafernalia and the total infrastructural fabric. It is so obvious and it is so much a part of life.

Behavioural Trends

Since the drinking water tubewell involves no cost to the community, the community hardly have any participation at the planning stage of the programme. Any alien proposal for the installation of the hand pump (tube well) would, therefore, at the initial stage receive an overwhelming support from the residents of a village full with enthusiasm, curiousity and amusement.

This is obviously because of the visual appeal of the total population and a kind of status value. Every powerful villager wishes that the tubewell should be located at his doorstep. No one at this stage would ever consider or realise that a tubewell on the roadside may eventually spoil the road by making passage extremely slashy causing increase in population of mosquitoes or flies threatening the hygiene and sanitary conditions. Due to the proposed tubewell the place may also turn noisy which is not uncommon specially during the rush hours of morning and afternoon.

But when the tubewell in the village becomes a reality it is not accepted by the community merely on its face value. If the taste of water differs even slightly from their existing traditional source, the people will have their reservation about accepting the new source of water. The fact that the tubewell water is protected from bacterial contamination would not convince the villagers to win their acceptance. Again, the new source must also pass the test of housewives who reject the water if it takes longer time to cook the lentils of grams.

This is depicted in Table V along with some other behavioural features. In Mayurbhanj, the percentage of acceptance is low partly because the programme is new whereas in Purulia it is higher as gradually the community sees the good points of accepting the new device. In Purulia the sample survey indicates the use of tubewell water for drinking on 2 occasions even though it has not been found suitable for cooking.

It is also observed that the people are protecting the sanctity of the tubewell site by not allowing the children toilet wash though taking bath or washing utensils are not considered a taboo except in a few locations in the district of Purulia where people have put restrictions against taking bath

Table 7. Utilisation of the tubewells

Areas		Water quality		Water use		Behavioural trends					
		Good	Brakish	Drinking	Cooking	Kitchen garden	Bathing	Children Toilet wash	Washing clothes	Washing utensils	Washing animals
Mayurbhanj (Orissa)	Sample 52	40	12	31	31	14	29	0	25	25	3
Total bores with hand pumps	Percentage 100	77	23	59.6	59.6	27	55.7	0	48	48	5.7
Purulia (West Bengal)	Sample 43	28	13	36	34	15	21	0	19	23	8
(Total bores with hand pumps-248)	Percentage 100	65	31	83.7	79	35	49	0	44	53.5	18.6

and washing clothes and utensils at the tubewell platform. In some of the blocks people have been able to stop these community habits totally.

Not so often, the excess water is being channelised to irrigate kitchen gardens (kitchen garden is rather a urban concept in India that was acclaimed by systematic official campaign. In rural areas, kitchen garden is a traditional vegetable farming in the backyards). This aspect is important because this helps in understanding peoples' spontaneous attitude towards water. The tendency is common throughout the country depicting a very hopeful trend. While the tubewell is marked exclusively for drinking water purposes, people have themselves derived further benefits from it which has eventually widened its scope. This should provide an important feedback to the planners of this huge national programme. The prospect for the entire drinking water programme may as well be thoroughly reviewed to see if there could be a programme of even a larger magnitude replacing the present drinking water programme. This broad based programme may serve both drinking water as well as irrigation needs. Awareness is gradually developing in the villages where tubewells have been installed for some time ranging between 5 and 15 years. This is after a prolonged mechanism of persuation truly demonstrative in nature because a number of hand pumps been have broken, left out and abondoned in the process—a number of drilled wells have been written off. In the new villages the curious residents pass through all the experience that the earlier villages have undergone with the result in a number of interior villages hand pumps are still not functioning.

There is need to plan an educational programme keeping in view the experiences gained. Such a programme should be based on media mix for penetrating the heart and mind. Unfortunately even with heavy investment in technology, this dimension has been ignored. Consequently, many human problems are multiplying.