


**WEDC**
**12th Conference: Water and sanitation at mid-Decade: Calcutta 1986**
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**Water Decade and Calcutta water supply**

**1.0 INTRODUCTION**

"Clean water and adequate sanitation for all by the 1990" was the target set, in the year 1980, by the United Nations. The time span allotted for achievement of the target was the Decade-1981 to 1990. Today, in the year 1985 we are in the middle of the time span. Where are we now? How far is the Decade target relevant to old urban areas like the great city of Calcutta? What are the problems? What are the solutions? These questions with reference to the water supply of Calcutta have been discussed here along with general issues on urban water supply systems.

**2.0 DECADE OBJECTIVE**

A basic minimum level of water and sanitation for all the people of the World - particularly for those who did not have any such access was the main object of the water Decade. The HABITAT symposium declared - "clean water should be provided to all people in all settlements by a specific date, say 1990".

For fulfilment of the target, nations were requested to fix their service standard according to their suitability. It was declared that government should adopt programme with realistic standard for quality and quantity to provide water for rural and urban areas by 1990 if possible. We hear, in connection with the Decade, some flexible standards as expressed through - "reasonable access to safe water"; or "appropriate technology" or "adequate sanitation" etc. The reasonable access for example have been defined to that when the water points, in urban areas, are available within 200 meters from the house, for rural areas the reasonable access was defined as - "housewives do not have to spend a disproportionate part of the day in carrying water for the family". The word "disproportionate" is non-specific too and there are conflicting opinions regarding the reasonable distance.

We can, perhaps, sum up the Decade target as - to supply drinking water and provide sanitation to all the people of the World in a way which is technologically, socially and economically feasible and which will bring welfare in health and economy of the people by reducing diseases and hardships. The water shall be safe for various uses and shall be of such quantity as would satisfy the minimum needs

for a healthy life. The flexibility in quantity and quality is a practical proposal.

**3.0 CALCUTTA BACKGROUND**
**3.1 Consumer composition**

City of Calcutta, having a population of about four million, is one of the world's important urban concentrations. Several sections of people live in the city of Calcutta. In addition to the residents of the city several thousands of persons are regularly coming to the city for economic gain. They spend about eight to ten hours a day in the city enjoying city facilities. The residents of the city can be broadly divided as - street dwellers, squatters or slum-dwellers, low income families in semi-pucca or pucca housing, middle income families huddled in rented houses, higher middle income families in individual houses or rented apartments, higher income families and rich in good, comfortable living space or in multi-storied flats in good locality.

**3.2 Water demands**

The per capita water requirement of the consumers depends upon several factors like educational standard, economic status, housing and shelter facilities, standard of living, nature of plumbing fixtures, number of taps, distance of the water source from the residence, season, age, culture, social customs, cost of water, regularity of supply and other factors. The different groups of people of Calcutta have widely varying economic conditions, cultural backgrounds, educational status, housing facilities and water supply appliances. As such they have different real water demand. If we can supply this real water demand, to the concerned groups of people, then the objective is adequately fulfilled. The quality of water obviously should not be injurious to health.

Several U.N. organisations including the World Bank and the W.H.O. time to time tried to assess this percapita demand for the third world urban and rural population. For urban areas percapita water demand stated to vary from a bare minimum of 3 gallons per day to 40-50 gallons per day depending on consumers character and type.

Dr. Gilbert White after study of third world urban water demand had assessed the demand as -

City dwellers depending on public stand posts	- 2 to 11 gallons per day.
City dwellers with single house hold taps	- 3 to 20 gallons per day.
City dwellers with several taps	- 8 to 60 gallons per day.

A World Bank report said that "health benefits of safe water are attainable at service levels of 30 to 40 litres (7 to 9 gallons) percapita per day on site, this will provide for protection against the range of water related disease and adequate for the personal hygiene which (with health education) will lead to less diarrhoeal diseases, skin and eye infections and fewer parasites on the skin. For the later access to water is more important than the microbiological or chemical quantity".

Allocating a real water demand rate, depending on the variable factors as stated earlier, to the different groups of people, the probable real domestic water demand for Calcutta (old limits) works out to about 109 mgd. If we add to the real demand an allowance for industrial and commercial use and leakage of about 35% of the total supply then a demand of 180 mgd will mature.

### 3.3 Available water supply

The several water sources which are meeting water demands of the city in various forms are -

- Treated surface water from Pulta Water Works.
- Treated surface water from Garden Reach Water Works.
- Surface water through unfiltered water system.
- Public deep tubewells and hand tubewells.
- Private deep tubewells and hand

tubewells.

Private small intakes.

Other sources-wells, tanks, ponds etc.

The water of River Hooghly is also used for bathing purposes. The unfiltered water is generally used by the street dwellers for bathing or washing purpose.

A conservative assessment of the combined total capacity of all the sources indicate that more than 200 mgd of water can be made available for Calcutta.

### 3.4 Overall situation

Apparently City's capacity to produce water, looks sufficient. Moreover, due to several water supply improvement programmes extension of pipe lines, sinking of hand tubewells and construction of street stand posts water points are available within 250 ft. The growth of Calcutta and its continued attraction indicate that the city water supply is not too troublesome.

The actual position of water supply, however, is not so bright. There are reports of water shortage, low pressure, drytaps, breakdown and chockage of tubewells regularly. In some areas the water qualities are doubtful and there are occasional out breaks of water borne diseases. What has gone wrong then? It is essential that in the mid decade we examine the situation critically.

## 4.0 DEFICIENCIES

### 4.1 General

Obviously the hydraulic efficiency of the complicated network is inadequate. The pipes are old, there are also defects in the pumping system; pipe leaks; chockages; intermittent supply hours; etc- these however are not totally unexpected of a century old distribution system. Over and above these profuse quantities of water get wasted through open stand posts or by individual consumer. The quality of water cannot be maintained high due to the leaks, low pressure and intermittent supply.

### 4.2 Human factors

Before going further into the deficiencies, some human factors are highlighted. Safe water supply alone or even safe water and sanitation do not guarantee protection against water borne diseases. Lack of health education lack of personal hygiene, hygienic habits of mother, play an important role in spread of diseases. The water may be pure but the

collecting and storing containers may be dirty. It is said that "clean water for all" by itself will not bring health but there cannot be health without it".

In slums or group housing system for lower income groups the ladies and house wives will not come out to the roadside water taps or tubewells for washing themselves or for proper bathing- they would prefer alternative sources like tanks, ponds etc in the vicinity where the water is doubtful. Their water uses sometimes are limited to the amount they are able to collect and haul from the roadside water points. A single tap within a house/hut where several rented families stay does not encourage hygienic water usage to the required level.

The slum dwellers or the urban poor are to be treated as a very important users of the water supply system and if proper sanitation and water supply are not provided then these points become a threat to city life for transmitting disease. The hardships of urban poor, if they do not get water are more severe than those of rural poor as the urban areas are too concentrated and too environmentally polluted.

#### 4.3 Wastage and misuse

Some of the fortunate higher and middle income groups who are advantageously located in relation to the water supply system as a whole, draw profuse quantities of water. They use a part of it, misuse another portion and waste the remaining. They draw water more than that is required. They store water in cisterns only to empty it next morning, so that fresh water can again be stored. They never close the taps. Why should they? Water is practically free. The amount of corporation tax is fixed and whether they draw 20 gallons per day or 150 gallons per day, the amount of tax remain the same. Their physical location is so advantageous that the system is able to deliver any amount of water. As a result, other consumers particularly the lower income group consumers on the fringe do not get the required quantity of water. During summer peak hours when demands are high, the distribution system is unable to deliver required water at desired quantity due to the skewed pattern of withdrawal. Leakage and wastage through street stand posts add to the scarcity. The ground water sources which are shallow tend to yield less

water and if there be any breakdown the position becomes very difficult.

#### 4.4 Leaks

The pipe line system being very old continuous vibrations due to the wheel loads had resulted many leaks in the system, there are some corrossions also. The leaks from old mains and wastage through stand posts account for about 35% of supply. According to an estimate about 40 mgd water can be saved by reducing leakage. When the water pressure is low these leaks may be entry points of contaminated water as the supply hours are intermittent.

#### 4.5 Ground water tapings

Uncontrolled tapings of ground water resources by the rich owners of multistoried buildings and industrial and commercial establishments is another problem. The privileged class is getting water to their full oversatisfaction by abstracting directly the underground water through high rate pumps without paying the economic price of ground water. These withdrawals are preventing in summer, other relatively backward consumers or public body to pump water to fulfill their needs. Every gallon of ground water has an opportunity cost- this is not being paid by the rich. Since the demand of ground water is high during summer and marginal value in use is high; the high rate abstractors of ground water should pay the marginal value of others and not just a nominal tax. The authorities should be aware of "tragedy of commons".

#### 5. BETTERMENT APPROACH

Improvement of the hydraulic efficiencies through interconnections replacement of old pipes and addition of new components like pumps, reservoirs and pipe lines have been taken up. It is to be pondered whether to create more treatment plants, boosters etc without correcting old systems. It is necessary to strengthen the pipes, plug the leaks and then add new sources. Prevention of wastage and misuse can only be tackled by social pressures from the citizen as metering in large scale may be unsuitable.

A strong consumer motivation is required. Since the city residents are approachable by media - Radio, Cinema and newspapers, they should be motivated with health education. If a consciousness can be grown within them regarding the necessity of

proper water use, hygienic habits etc they will utilise the facilities properly. Indiscriminate ground water tapping can be controlled by taking penal measures.

#### 6.0 CONSUMER PARTICIPATION

Consumer participation in planning and system monitoring is very important contacts with mass should be established local people in groups are to be invited to lodge their grievances, to offer their suggestions and to analyse the present situation. Unless the deficiencies of existing system are correctly diagnosed no efficient improvement programme can be chalked. The local people can show - where there is defective subsoil or poor cushion, where the pressure is low, where the pipes are frequently leaking, where the street taps only waste water, where the pressure is high, where there is long queue for water etc. Some of the local residents may suggest perfect technical reasons, for such malfunction, and even technical solutions through sheer experience.

#### 7.0 EVALUATION - MONITORING

Evaluation, monitoring and feed back are essential. If it be possible to identify facts of failure, breakdowns, misuse and then analyse the reasons; evaluate the alternative solutions and then review the whole situation then it may be possible to improve planning. This "Critique" portion require extensive survey for which groups of investigators, consisting of social workers, surveyors, engineers, planners, statistician etc should be formed. Formats for reporting regularly the break down history, technical survey of source and distribution system, water use and collection survey etc should be developed for proper records.

#### 8.0 THE RURAL CONTRAST

In rural areas some brisk activities on water and sanitation development are taking place recently. Piped water supply and sanitary latrines are being introduced to villages, even where the real demand for such facilities are absent. Most of the rural population were accustomed socially, psychologically and even bacteriologically to conventional system and they do not like new systems. Some national and international agencies however are over interested to get involved, in the decade, with rural water supply.

#### 9.0 THE URBAN SCENE

The urban water supply augmentation and maintenance are less glamorous but more fruitful. Persons who are accustomed with use of tap water or water closets and who do not have any other alternative feel immensely benefitted when the defective pumps, pipe lines tubewells or choked latrine are corrected. Not only these works are devoid of publicity but technologically these works are very difficult to execute in old busy cities like Calcutta. The underground space below roads and streets are too congested with utilities. Sufficient room are not available for laying or repairing water and sewer lines. The roads are always busy with heavy traffic and complete road closure is not possible during execution. Working in the available narrow space keeping the traffic and pedestrian flow uninterrupted are extremely difficult and hazardous. Moreover during such work the water supply of city cannot be stopped for obvious reasons.

Thus the augmentation, maintenance and operation of the old system are always a challenge to all and particularly to the engineering profession.

#### 10.0 CONCLUSION

In very old cities the water supply position may deteriorate fast unless preventive maintenance works are taken up simultaneous with augmentation works. In the past, during the sixties and the seventies some international agencies took part in preparation of master plans for water supply and in funding water supply projects for Calcutta. Many of these plans did not stress on the upkeepment of existing facilities. Nevertheless, continuous system monitoring, development of proper operation and maintenance activities, consumer participation in planning and appropriate engineering practice, if taken up during remaining part of the decade, will no doubt bring the water supply position to a satisfactory state fulfilling the decade objective.