

NEED ASSESSMENT FOR SUSTAINABLE SANITATION SERVICE FOR A TRIBAL SCHOOL IN RURAL MAHARASHTRA

Anil B. Rai,
Engineers Without Border, Mumbai Chapter
Tel No - +919930702628
Email -raia@bv.com
Sandeep Kinge
Engineers Without Border, Mumbai Chapter
Tel No - +919820284771
Email- kinges@bv.com
Ashwin Powar
Engineers Without Border, Mumbai Chapter
Tel No - +919820509903
Email- powara@bv.com

Abstract

Sustainable sanitation is defined as promoting and improving health and hygiene, protecting environmental and natural resources, and being technologically and operationally appropriate, financially and economically viable. Water, sanitation and hygiene (WASH) services levels still remains low priority in rural India despite high levels of public expenditure during recent decades.

The authors strongly believe that a systematic process-oriented assessment approach is one key to sustainable sanitation. This paper will discuss the merits and challenges of these planning methodologies in reference to experience from a tribal school in rural Maharashtra. The intent of this study is to compare various wastewater systems from different perspectives.

Keywords: Sanitation, hygiene, wastewater.

1. Health of a Nation

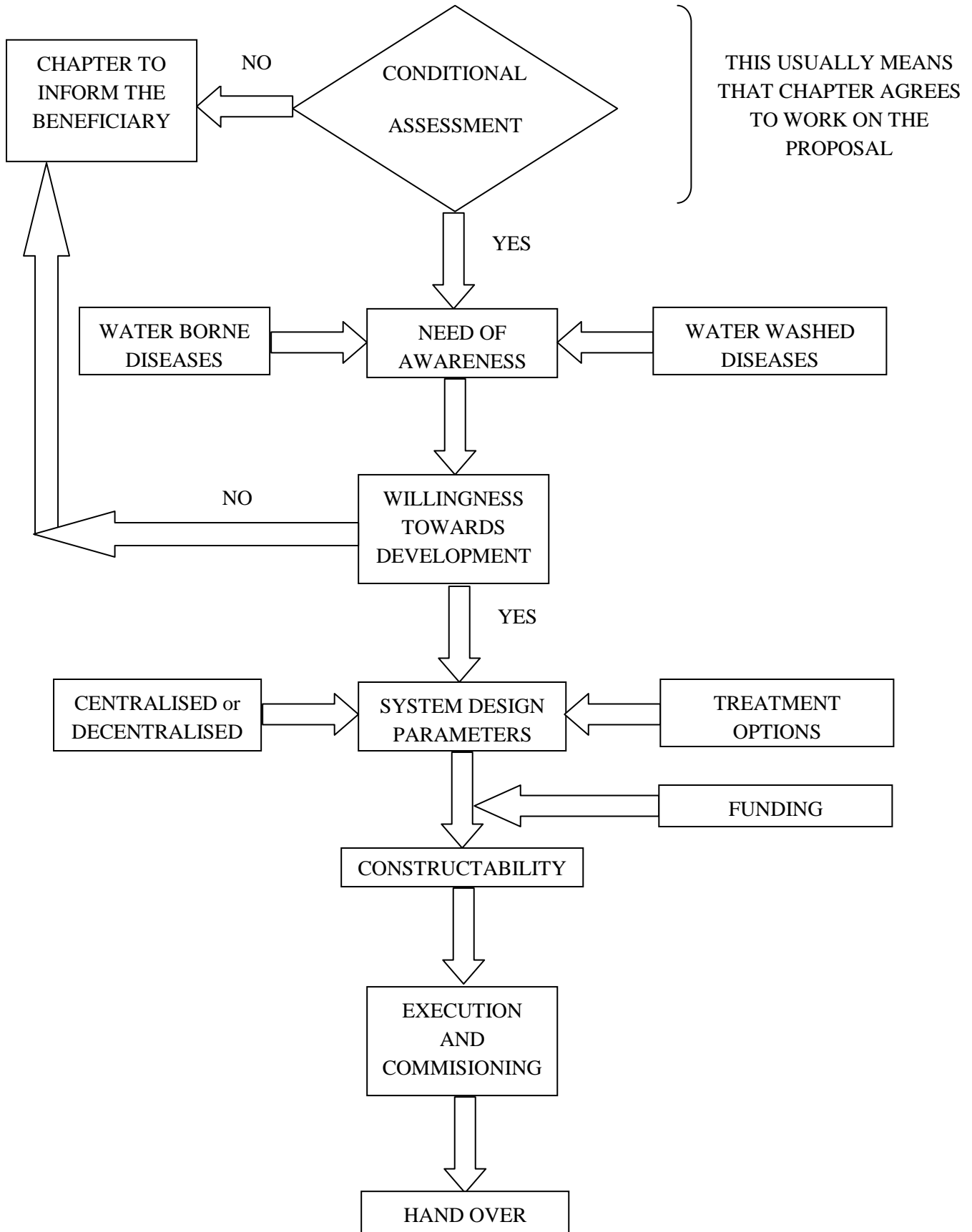
We do agree with the statement “You can judge the health of nation by the number of taps, rather than the number of hospital beds.” Prophesised Dr Halfdan Mahler, WHO Director-General, at the UN General Assembly in November 1980. According to Zöllner et al (2003), the broad definition of the ‘Health of a Nation’ can be – “its physical, mental and social functioning and ability to cope with life’s daily challenges – is one important determinant of national economic performance.”

For the context of this topic, it is nothing but the economic performance of nation, which depends on the health of every citizen; hence an unhealthy citizens forming an unhealthy society cannot prosper due to ill health and resulting into low productivity of a nation. Various causes and effects are discussed in this paper to support the above statement like diseases due to lack of water, quantity of water available, distance to travel to fetch water and so time and their effect on the economy of the society and hence the nation.

According to JMP Reports (2000 & 2005), the population of the world is increased by 15% in a decade (1990-2000) and the main contribution is from the developing world mainly Africa, Latin America & Caribbean, and Asia. It has been observed in the same report that, 1.1 billion people (approximately, one sixth of the world’s population in 2000) in the world lack the access to the improved water supply and the majority of these people live in Asia (63%) and Africa (28%).

2. Need Assessment to provide suitable sustainable

NEED ASSESSMENT



3 Conditional Assessment

The factual figures and their impacts on health of our nation inspired us and instead of waiting for our government to take action to solve the public health issues around our communities, we started defining the issues and finding their root causes to solve them quickly with systematic and minimal inputs.

Our search ended within 80 Kms from Mumbai. There are number of tribal communities around Mumbai which lack safe access to water and basic sanitation. We focused on a tribal boarding school at Kalambhai, Tq. Wada, District Thane. This school has 540 students including both boys and girls from the tribal communities around the school. The parents of these students work as construction workers in and around Mumbai and Thane region; however, these students reside in this school and study there all around the year.

The school has government aid of rupees 600 per student per month for 400 students only. The school management manages the rest funds (for 140 students) from various private donations and grants received based on their achievement in the field of sports and academics. Looking at their achievements despite of their condition, we started with donation of some materials needed for basic living like blankets and mats to sleep and CFL bulbs, simultaneously started campaigning on Water Quality, Hand Washing, Hygiene and IT education to improve their life. We studied and observed that the impact of education/awareness on their life is highest than providing any solution.

While providing such education, we realised that the school has sufficient ground water source for their water demand. However, the sanitary condition is in most horrible condition. To solve the issue, we defined and followed a systematic need assessment of their sanitary condition for providing basic sanitation as their right and dignity.

3.1 Water Borne Diseases

There are various diseases related to water such as diarrhea (major problem), Malaria, Cholera, etc. According to Facts and figures in World Sanitation and Health (WSH), World Health Organisation (WHO) (2004), the diseases related to water and their severity, cause and its solution is as follows –

Diarrhea alone (including cholera) contributes to 1.8 million deaths per annum (90% children under age 5) mainly in developing countries. The cause of 88% of diarrhoeal disease is attributed to unsafe water supply, inadequate sanitation and hygiene. Improved water supply can reduce 6% to 25% diarrhoeal morbidity.

Malaria takes 1.3 million lives per annum (90% are children under 5). Intensified irrigation, dams and other water related projects contribute importantly to this disease burden.

Schistosomiasis, the disease is strongly related to lack of face washing, often due to absence of nearby sources of safe water. 500 million people are at risk from trachoma. 146 million are threatened by blindness. Improving access to safe water sources and better hygiene practices can reduce trachoma morbidity by 27%.

Intestinal helminths (Ascariasis, Trichuriasis, Hookworm), 133 million people suffer from high intensity Intestinal helminths infections, which often leads to severe consequences such as cognitive impairment, massive dysentery, or anaemia. These diseases cause around 9400 deaths every year. Access to safe water and sanitation facilities and better hygiene practice can reduce morbidity from ascariasis by 29% and hookworm by 4%.

According to Agarwal et al (1981), '*Basillary Dysentery*' and various diarrhoeal infections, for example, can be classified as water borne diseases, because water contaminated with faeces is sometimes the spreading medium. But they are more often spread by a lack of hygiene caused by a shortage of water by a mother who has not washed her hands properly, by contaminated and improperly washed and cooked food, and by dirty pots and containers.

Dr. Julia Walsh and Dr. Kenneth S. Warren of Rockefeller foundation estimate that there are 3-5 billion cases of diarrhoea every year. Each case lasts from 3-5 days, so the effects on work must be enormous. The author further explains with an example how water borne diseases affect the health of a nation. It has been estimated in India that 73 million man-days were lost every year from waterborne diseases-"a staggering figure of 'involuntary strikes', many times more than the peak man-days lost in any year on account of industrial disputes", as one Indian publication on rural development puts it. The cost to India in terms of medical treatment and lost production from waterborne diseases has been estimated at around 4,500 million rupees (about \$600 million) per annum

3.2 Water Washed Diseases

According to Agarwal et al (1981), many skin and eye diseases (scabies, skin sepsis, fungal infections and trachoma) are not water borne at all, but they are greatly influenced by water-use practices in a community. These are other water-washed infections that are spread by fleas, ticks, lice and mites. All these diseases can be classified as water-washed diseases and their incidence is likely to be affected more by the quantity of water than by its quality.

3.3 Water supply and its Relationship with hygiene education

According to JMP (2000), Major health risks arise where there is poor hygiene. Agarwal et al (2000) states that the water related diseases such as enteroviruses, dysentery, diarrhoeas, typhoid, cholera etc, depend strongly on personal and domestic hygiene. So, the provision of water supply, sanitation facilities and health education must go together. If each component is implemented separately, much of the health benefit may be lost. According to WHS, WHO Report (2004), Hygiene interventions including hygiene education and promotion of hand washing can lead to a reduction of diarrheal cases by up to 45%.

3.4 Investment study for water taps

According to JMP (2004), Investments in drinking water and sanitation yield high dividends, increased use of improved water and sanitation has many benefits: a significant reduction in disease, especially diarrhoea; averted health-related costs; and time savings associated with having water and sanitation facilities located closer to home. Time saved may translate into higher productivity and school attendance, more leisure time and other, less tangible benefits, such as convenience and well being, all of which can have an economic impact. If these benefits are translated into monetary terms, it is possible to compare the total benefits with the costs of a potential intervention. Such a valuation can often tip the balance in favour of water and sanitation investments. A recent cost-benefit analysis undertaken by WHO found that achieving the MDG target in water and sanitation would bring substantial economic gains. [have stated the same] Every \$1 invested would yield an economic return of between \$3 and \$34, depending on the region, [Hutton and Haller (2004)]. Globally, meeting the target would require an additional investment of around \$11.3 billion per year, over and above current investments.

4. System Design Parameters

4.1 Conditional Assessment

As per the flowchart given above, we did conditional assessment of the existing sanitary system at the school and the findings are as listed below:

- Existing toilets do not have separate urinals
- Toilets have limited water availability
- Stinky and dirty toilets
- No soaps available near the water taps to wash hands
- Stinky bathrooms and often used as urinals
- Improper drainage within school
- Flooded toilets
- Inaccessible toilets due to distance to the toilets from the school
- Improper lighting in the toilets and bathrooms
- No lights in toilets
- Improper floor slopes in toilet blocks leading to water ponding
- Low frequency of toilet cleaning
- Lack of toilet training

4.2 Consequence of improper sanitation:

All these above conditions trigger the students to excrete and/or urinate outside the toilet and especially near their boarding/school thus resulting into pollution of the ground water source, mosquito breeding, spreading of diseases like malaria, dengue, viral fever, cholera, dysentery, Diarrhea, etc., which has direct impact on their life. .

4.3 Awareness creation and willingness towards development

During our water quality monitoring, hygiene and hand washing campaigns, we observed that the students and school authority is now well aware about the issue and now they are willing to work towards their development with partial participation in the defined project.

4.4 Factors Considered During Treatment Option Design

The following parameters were considered during treatment option selection:

- Low cost treatment system
- Low operation and maintenance cost
- Simple in maintenance
- Safe during operation
- Treatment efficiency
- Skilled supervision requirement during operation.
- Skilled supervision requirement during maintenance
- Training requirement for operation and maintenance of the system
- Site constraints
 - High ground water table
 - Power fluctuation
 - Time required for constructing the treatment system

4.5 Treatment Option Selection Matrix

<u>Sr. No.</u>	<u>Treatment System</u>	<u>Construction Cost</u>	<u>O & M Cost</u>	<u>Man Power</u>	<u>Power Requirement</u>	<u>Land Requirement</u>	<u>Maintenance</u>	<u>Operation Supervision</u>	<u>Awareness of the System</u>	<u>Gas Generation</u>	<u>Training Required</u>
1	Septic Tank	Medium	Very less	Unskilled	No	Less	Once in 2 years	No	Yes	No	No
2	Reed Bed/Rock Fill	Medium	Less	Slightly skilled	No	Very High	Medium	Medium	No	No	Yes
3	WSP	Medium	Very less	Unskilled	No	Very High	Less	Less	No	No	Yes
4	VIP Latrine	Less	Less	Unskilled	No	Very less	Less	Less	No	No	No
5	Bio digester	Medium	Medium	Skilled	Yes	Medium	High	High	No	Yes	Yes
6	Urine Separation	Medium	Medium	Slightly skilled	Yes	Less	Less	High	No	No	Yes
7	UASB	High	Medium	Skilled	Yes	Medium	High	High	No		Yes
8	Lagoons	High	Medium	Skilled	Yes	High	High	High	No	No	Yes

Abbreviations:

WSP – Waste Stabilization Ponds

VIP Latrines – Ventilated Improved Pit Latrines

UASB – Upflow Anaerobic Sludge Blanket

5. Conclusion

The systematic approach for the need assessment to provide sustainable sanitation has merits such as properly defining the problem, finding root cause, finding economical and most effective technology, ecofriendly and userfriendly technology, bringing in ownership in the solution through community involvement. However, there are some challenges also, such as time required to finalise the solution, many awareness campaigns are needed to understand the need and willingness for their development and finally convincing all the stakeholders for selecting/providing specific technology.

References

- Agarwal, A. et al. (1981) *Water, Sanitation and Health- for all*, Earthscan, London
- Health Economics (1975), *World Health Organization*, Public Health Papers, No. 64 Geneva
- Hutton, G. and Haller, L. (2004) *Evaluation of the costs and benefits of water and sanitation improvements at the global level, Water, Sanitation and Health, Protection of the Human Environment*, World Health Organization, Geneva.
- Joint Monitoring Programme (JMP) (2000), *Global water supply and sanitation assessment report (2000)*, World Health Organization, Geneva, Switzerland
http://www.who.int/water_sanitation_health/monitoring/jmp2000.pdf
- Joint Monitoring Programme (JMP) (2004), *Meeting the MDG Drinking water and Sanitation Target*, World Health Organization, Geneva, Switzerland
- Joint Monitoring Programme (JMP) (2005), *Water for Life: Making it happen*, World Health Organization, Geneva, Switzerland
- Hutton, G. and Haller, L. (2004) *Evaluation of the costs and benefits of water and sanitation improvements at the global level, Water, Sanitation and Health, Protection of the Human Environment*, World Health Organization, Geneva.
- Joint Monitoring Programme (JMP), (2000), *Global water supply and sanitation assessment report (2000)*, World Health Organization, Geneva, Switzerland
http://www.who.int/water_sanitation_health/monitoring/jmp2000.pdf
- Joint Monitoring Programme (JMP), (2004), *Meeting the MDG Drinking water and Sanitation Target*, World Health Organization, Geneva, Switzerland
- Joint Monitoring Programme (JMP), (2005) *Water for Life: Making it happen (2005)*, World Health Organization, Geneva, Switzerland