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Low Cost Water Treatment by Using Sand Filter

Omkar Padvekar[1], Mandar Pawari[2]

[1]UG Student, Department of Civil, VPM's Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra, India

[2]Assistant Professor, Department of Civil, VPM's Maharshi Parshuram College of Engineering, Velneshwar, Maharashtra, India

ABSTRACT

A study has been conducted for designing, constructing and evaluating of an effective sand filter. Different types of sand filter and important filter media was used for the modification of sand filter. The flow rate of the sand filtered water decreases significantly with increase in turbidity.Sand filter an intermittently operated household Slow Sand Filter (SSF) is one of the most promising POU water purification methods used for rural areas.

I. INTRODUCTION

About 884 million people in the world especially in the rural areas and low-income communities still do not have access to safe drinking water sources. Five million people lose their lives due to water-related disease each year. It is estimated that around 37.7 million Indians are affected by waterborne diseases annually, 1.5 million children are estimated to die of diarrhea alone and 73 million working days are lost due to waterborne disease each year. Millennium Development Goal (MDG), Target 10 aims to half the population in 1990 without sustainable access to safe drinking water and sanitation by 2015. Even so, 672 million people will still lack access to improved drinking-water sources in 2015. Central water treatment and distribution system can be economical in urban and densely populated areas but may not be feasible in rural areas with sparsely and remotely located population. The outcome is an unreliable water service in terms of quantity and/or quality. Providing safe drinking water also becomes crucial after any disaster to prevent the spread of waterborne diseases Hence onsite water treatment using Point of Use (POU).

The participants of this study built the sand filter on site and conducted a study. Water, collected prior to this study, was filtered in the sand filter and the obtained water quality was determined. The water quality was investigated by analyses of physical parameters and the presence of the chosen indicator organisms in samples of raw water and filtered water. A literature review was performed to determine what water quality should be achieved and alternative treatment methods should be considered. These methods were used to assess the potential and performance of the sand filter and its disinfecting effect on collected water. The aim of the study was reached by the results from the study and the literature review

II. METHODS AND MATERIAL

The method used in forming the sand filter is by locally available fine sand, coarse sand, gravels.
Fine River Sand (< 1 mm)
Fine Sea Sand (< 1 mm)
Coarse Sand (3 - 6 mm)
Gravel (6 - 15 mm)

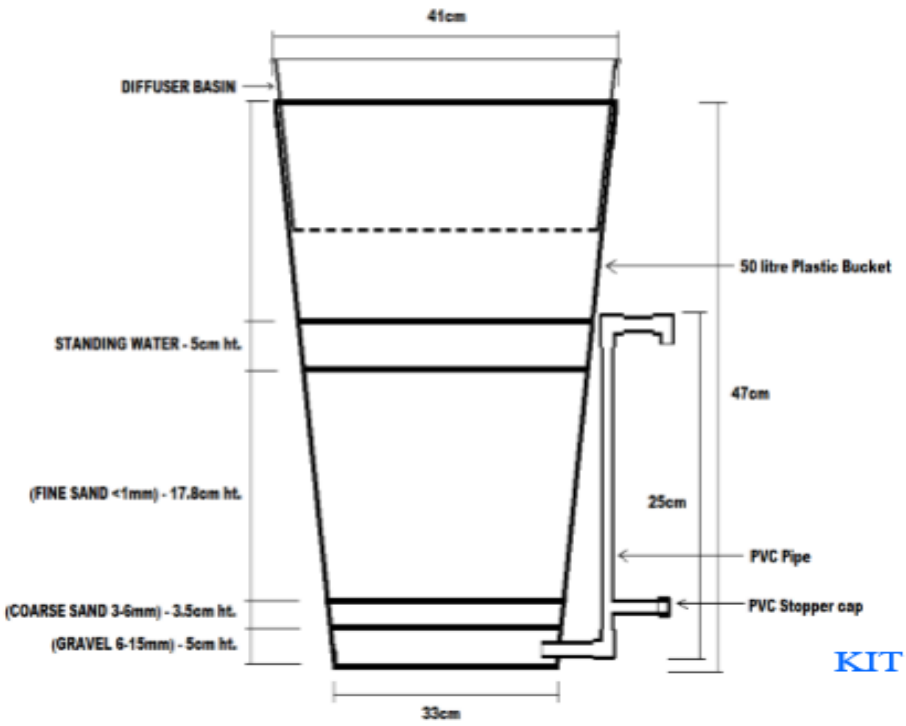
1. Size of Sand Filter - 40 cm X 30 cm
2. Different Filter Media OF Sand Filter –
   Layer 1 - Gravels (6- 15 mm) up to height 5 cm
   Layer 2 -Coarse Sand (3- 6 mm) up to height 5cm.
   Layer 3- Fine Sand (> 1 mm) up to height 17mm
3. Design Consideration –
   Rate of filtration - 10 to 40 lit/hrs/m^2
   Cleaning of filter- After 15 days
   Life Span of filter- 1 to 2 year

III. RESULTS AND DISCUSSION

After conducting all these tests the result are as follows:
Test Result of Water Sample

Sr. No	Parameter	Without Sand Filter	Sand Filtered Water	Water Quality Standard IS: 10500
1.	pH	6.12	6.7	6.5-8.5
2.	Turbidity (NTU)	6	1	5
3.	Suspended Solid (mg/lit)	600	180	500
4.	Dissolve Oxygen (mg/lit)	4	5	6.5-8
5.	Alkalinity (mg/lit)	146	98	200
6.	Chloride (mg/lit)	120	60	250

A. Figures and Tables



Typical Sand Filter

IV. CONCLUSION

1. All water quality parameter within the limit according to IS: 10500.Which is safe for domestic and drinking purpose.
2. The efficiency of sand filter depends on raw water quality and filter design.
3. The use of sand filter is very much suitable for the larger family, school etc.
4. It can be used for higher quality of water at lower costs.
5. The sand filter becomes cost effective and could be afforded by rural people.
6. The study has shown that designed sand filter shows the low health risk.
7. The constructed sand filter has lowered the flow rate so it has the good result for the water analysis and test.
8. The higher flow rate can be achieved by washing sand layers.
9. The sand filter users can use filtered water after one and half hour of pouring water into the filter.
10. This may be recommended that proper care must be taken for washing and moving the filter as there might be disturbed the filter media and layer.

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