



Economical Method of Reuse of Gray Water in Construction

A. A. Burungale, R. B. Ghogaare, V. S. Bere, S. V. Jadhav

Professors, B. Patil College of Engineering, Vangali, Indapur, Maharashtra, India

ABSTRACT

Water is one of the most abundant resources. India is suffering from the worst water crisis in its history and around 700 million people face problem of water shortage, approximately 200000 people die every year due to inadequate access to clear water. As due to increase in population, water demand has also increased which has led to the idea of using grey water as a source of water. Grey water is a waste water generated from household, office buildings and streams. This includes water from kitchen, showers, sinks etc. the best alternative and cost effective process in rural areas is the reuse of grey water. With the help of proper treatment grey water can be put to good use. By applying proper and economical treatment grey water can be reused for other purposes. As there are some lowcost technologies which will help to treat the grey water. Discharge of household greywater into water bodies can lead to an increase in contamination levels in terms of the reduction in dissolved oxygen resources and rapid bacterial growth. Therefore, the quality of greywater has to be improved before the disposal process.

Keywords: Greywater, Economical, Household, Water, (Water from Bathroom, Kitchen, etc.)

I. INTRODUCTION

Water shortage problems have become one of the most urgent problems of the 21st century. Some researchers have suggested that water shortage will become more serious than oil shortage in the future. Significant 50–80% of the household wastewater can be classified as greywater. Biological treatment techniques are highly efficient compared to physical and chemical. On-site greywater reuse is highly advantageous and can positively impact the environment. Policymakers & governmental agencies of water scarcity regions should promote such systems. Current building standards & codes underutilizing the benefit of those systems. Wastewater can also refer to groundwater that is contaminated due to a leaking septic tank or agents such as insecticide, petroleum products, blood, or cleaning liquids. Often, contaminated water can also be run through the municipal filtration system and be prepared for use once again. However, the nature of the contaminants may require additional measures before the water is suitable for use once more. Along with the use of chemicals to treat wastewater, the uses of environmentally friendly methods are sometimes employed. The building sectors are remarkably the largest consumers of fresh water in the world; thus, the reclamation and reuse of greywater for non-potable purposes helps to reduce a significant amount of water consumed within a building. Grey water contains chemical contaminants, physical contaminants and microorganisms. Grey water may contain chemicals from soap, dyes, and bleaches. It may also contain bacteria, viruses, protozoa. So, it is very important to treat grey water by using lowcost technologies. Wastewater originating from households is divided into greywater and

black water, based on its composition. Greywater is wastewater discharged from showers, bathtubs, washing machines and kitchen sinks, while black water is toilet wastewater. The advantage of recycling grey water is that it is a plentiful water source with a low pathogen and organic content. To illustrate, grey water represents 50–70% of total consumed water but contains only 30% of the organic fraction and 9–20% of the nutrients, thereby making it a good source for water reuse.

A. Problem Statement

The Grey water from many societies is directly discharged into drainage without any treatment and it is wasted also pollute the streams it goes, but this water can be treated and can reusable to the day to day use. For that we have to use some economical methods.

B. Objective Of The Work

- To study about the waste greywater sources.
- To prepare a proposal of a treatment unit which can clean water.
- To Provide clean and reusable water for flushing, garages, and gardens etc by Economical techniques

C. Scope Of Study

The main purpose of this report is to present the current state of the greywater management. We are implementing economical and easy to use methods to clean greywater and testing is to be done before and after treatment for quality, for this method we are planning to create basic model for Society for treatment of Greywater.

D. Importance of quality management in Construction Industry

The importance of properly established and managed quality control and quality assurance systems and other quality documents for the achievement of company business objectives cannot be ignored. Identifying potential critical factors that affect the quality performance of small-scale contractors before the commencement of projects will ensure client satisfaction at the completion of project. The aim of quality management is to do things at first time, eliminating waste and rework. To achieve this, it is necessary focus on "processes". A process is a task or a series of tasks. A process might be the vibration of fresh concrete, the preparation of drawing, or the way in which the quality manager acts with a client and with other members of construction projects.

E. Discussion

From the above table we can observe that all the value of

- pH is within the as per MPCB limit.
- The number of total solids was high before treating but after treatment value is within limit.
- The value BOD₃ was also more than limits before treating but after treatment value is within the limit.
- The value of COD was also more than limits before treating but after treatment value is within the limit.
- The value of Dissolved Oxygen is less than required limit hence this water if disposed in water bodies will be harmful for aquatic organisms.
- Therefore, this treated water can be used for cleaning, washing, flushing, and gardening.
- Hence the plants used in Hydroid bed worked effectively and had less maintenance.

II. METHODOLOGY

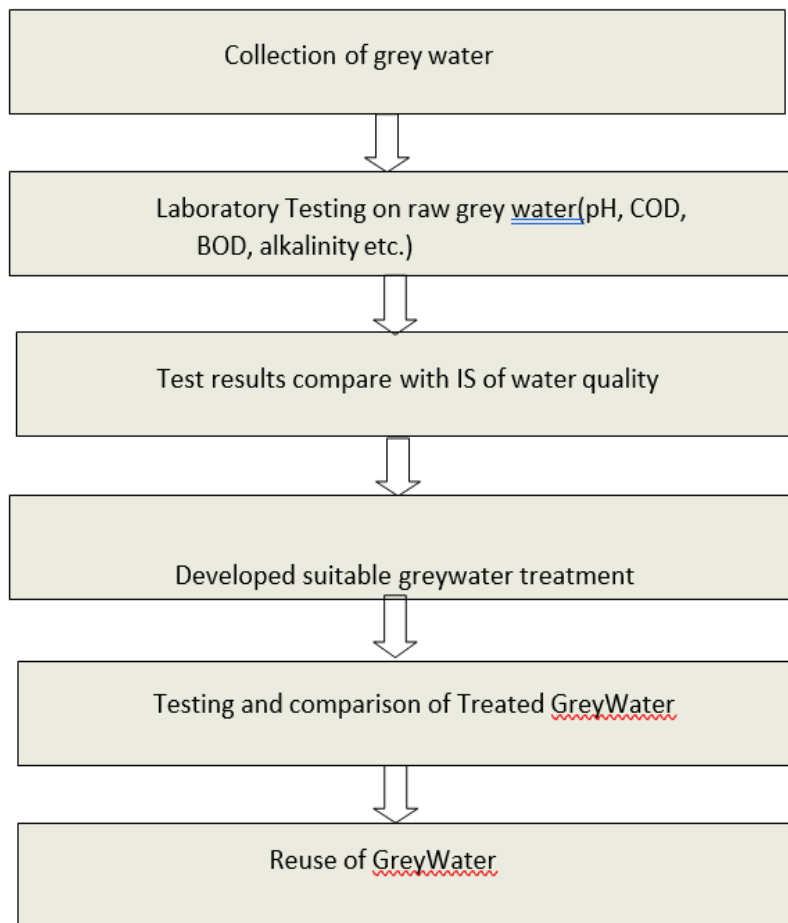


Figure1:Methodology

A. General

We studied the composition and sources of grey water. Visit various site and collect the grey water for testing. Now, we are going to do laboratory test and analyse all parameters of grey water like pH, COD, BOD etc. After knowing the all test result we are selecting the beneficial methods to treat the grey water and to conduct various suitable test on treated greywater. The working processes of the selected methods are as follows:-

III.RESULT

TABLE I TEST RESULTS ON GREY WATER

Parameters	Sample1		Sample2		Sample3	
	RawGreyWater	TreatedWater	RawGreyWater	TreatedWater	RawGreyWater	TreatedWater
pH	8.4	7.06	8.54	8.02	9.03	7.09
Hardness(mg/L)	248	205	267	170	371	110

TDS(mg/L)	420	340	440	329	460	390
TSS(mg/L)	159	95	182	88	198	82
Chloride(mg/L)	41	31	48	28	66	25
Turbidity(NTU)	45	4.9	58	3.8	85	3.2
DO(mg/L)	2.2	8	2.5	10	2.7	12
BOD(mg/L)	112	65	123	42	138.82	147.79
COD(mg/L)	303	110	322	145	339	158

A. Graphical Representation

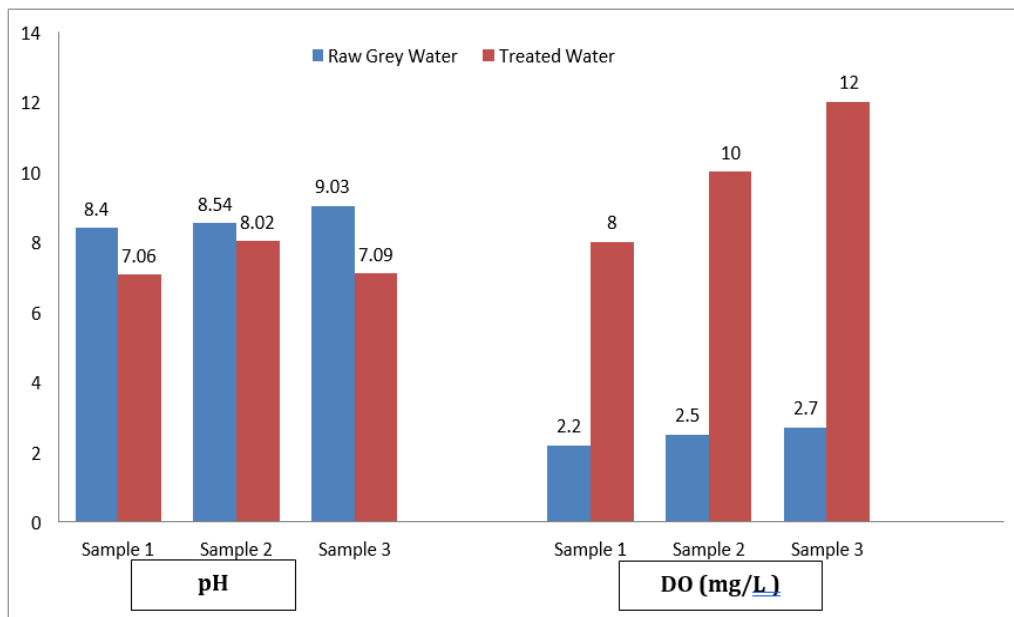


Figure2:Graphical Representation(a)

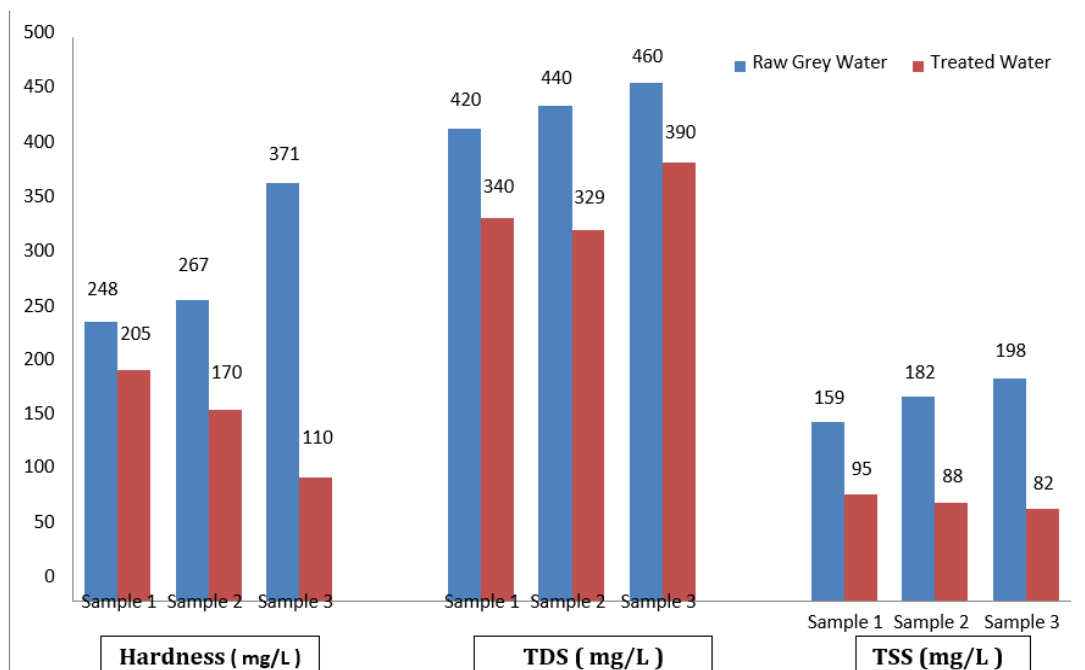


Figure3:Graphical Representation(b)

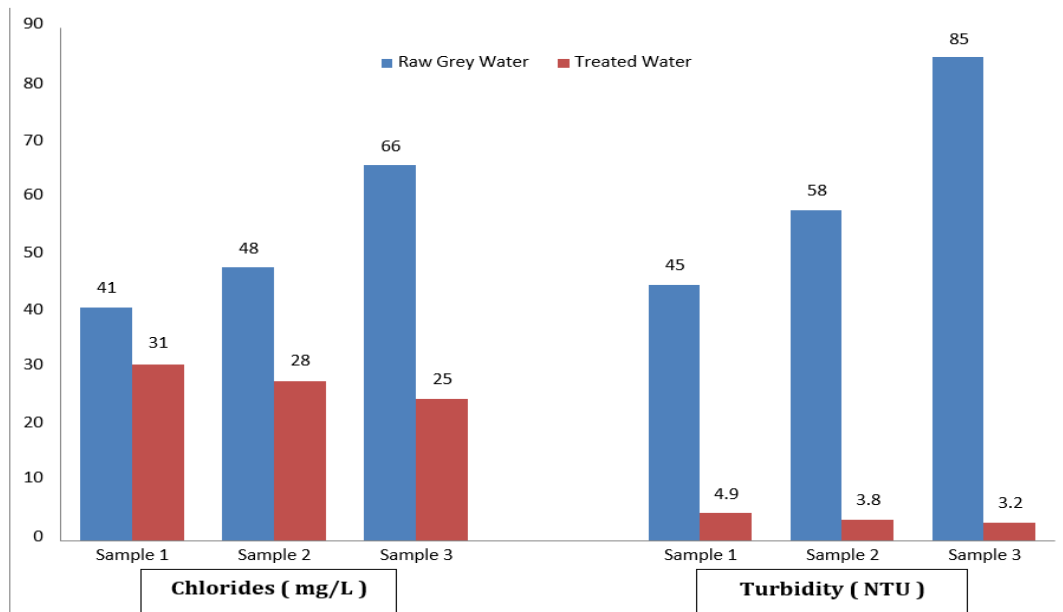


Figure4:Graphical Representation(c)

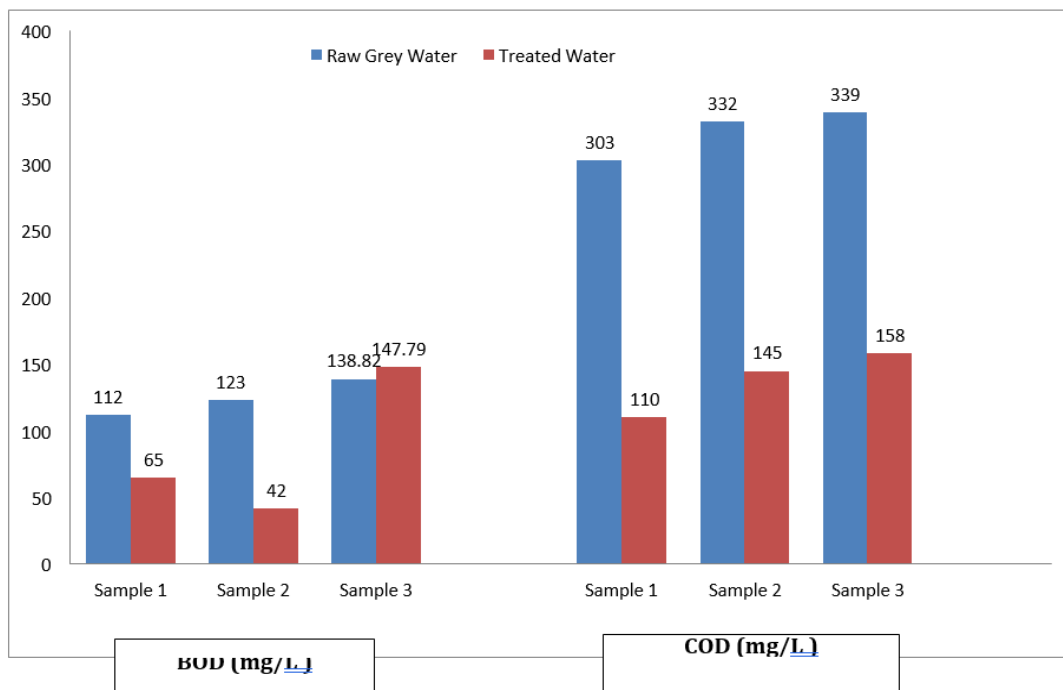


Figure5:Graphical Representation(d)

IV. CONCLUSION

- This study demonstrated that the designed sub-surface horizontal flow constructed wetland system could be used for treatment of the society waste water. A constructed wetland system can be an effective treatment facility for campus waste water.

- Regarding the performance achieved, the sub-surface horizontal flow constructed wetland was able to reduce further the level of the main physicochemical pollution parameters. The plants do play an important role in the treatment.
- The treatment level was affected by not only by the change of seasons, but also by the variation in influent quality and quantity.
- The overall experimental results demonstrated the feasibility of applying sub-surface horizontal flow constructed wetland unit to treat Society waste waters. Thus the root zone treatment can be utilized independently or as an addition to conventional treatment for complete treatment of waste water.

V. REFERENCES

- [1]. A. B. Al-Hamaiedeh, H., & Bino, M. (2010). Effect of treated grey water reuse in irrigation on soil and plants. *Desalination*, 256(1–3), 115–119. <https://doi.org/10.1016/j.desal.2010.02.004>
- [2]. Boano, F., Caruso, A., Costamagna, E., Ridolfi, L., Fiore, S., Demichelis, F., Galvão, A., Pisoeiro, J., Rizzo, A., & Masi, F. (2020). A review of nature-based solutions for greywater treatment: Applications, hydraulic design, and environmental benefits. *Science of the Total Environment*, 711, 134731.
- [3]. Gnanaraj, S. C., Thankam, G. L., Mukilan, K., & Nivetha, K. P. (2019). Greywater Treatment Technologies. *International Journal of Engineering and Advanced Technology*, 9(1S3), 425–430. <https://doi.org/10.35940/ijeat.a1020.1291s419>
- [4]. Mohamed, N. M., & Ali, S. S. (2012). Economic study for greywater reuse to achieve the sustainability in Egypt. *Australian Journal of Basic and Applied Sciences*, 6(3), 655–665.
- [5]. Thorat, P., Saniya, S., Shaikh, S., Shaikh, R., & Sonawane, A. (2019). Domestic Wastewater Treatment by Root Zone Technology Option: Colocassia Plant. *International Journal of Engineering and Management Research*, 9(2), 55–60. <https://doi.org/10.31033/ijemr.9.2.7>
- [6]. Shelar, P. A. B., Kalburgi, M. S. M., Kesare, M. N. D., & Kushwah, S. U. (2019). Research Paper on Treatment of Grey Water using Low Cost Technology For Kushvarta Kund Water. May, 7768–7774.
- [7]. Samayamanthula, D. R., Sabarathinam, C., & Bhandary, H. (2019). Treatment and effective utilization of greywater. *Applied Water Science*, 9(4), 1–12. <https://doi.org/10.1007/s13201-019-0966-0>
- [8]. G. Bhaskar, A., V.T. Deeptha, A. Abdul Rahaman. (2009) Root zone Technology for campus waste water treatment. *Journal of Environmental Research and Development*. Vol 3 No.3 January – March 2009.
- [9]. Vipat, V., Singh, U. R., & Billore, S. K. (2008). Efficacy of Rootzone Technology for Treatment of Domestic Wastewater: Field Scale Study of a Pilot Project in Bhopal. (MP), India. January 2008, 995–1003.
- [10]. Preethi Abinaya, M., & Professor, A. (2015). Reuse of Grey Water using Modified Root Zone System. 4(02), 454–458